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UNITED STATES GEOLOGICAL SURVEY
CHARLES D. WALCOTT, DIRECTOR

NORTH AMERICAN

GEOLOGIC FORMATION NAMES

BIBLIOGRAPHY, SYNONYMY AND DISTRIBUTION

BY

FRED BOUGHTON WEEKS

WASHINGTON
GOVERNMENT PRINTING OFFICE
1902

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LETTER OF TRANSMITTAL.

Department of the Interior,
United States Geological Survey,
Washington, D. C., November 27, 1901.

Sir: I have the honor to transmit herewith a manuscript entitled North American Geologic Formation Names: Bibliography, Synonymy, and Distribution, and to request that it be published as a bulletin of the Survey.

Very respectfully,

F. B. Weeks.

Hon. Charles D. Walcott,
Director United States Geological Survey.

NORTH AMERICAN GEOLOGIC FORMATION NAMES: BIBLIOGRAPHY, SYNONYMY, AND DISTRIBUTION.

By F. B. WEEKS.

INTRODUCTION.

This publication contains:

(1) A list of all North American sedimentary formation names, arranged alphabetically by geographic provinces under each of the larger geologic subdivisions to which they have been assigned, in general, by various authors.

(2) A list of the names used to designate a particular stratum or aggregate of sedimentary strata within the area of North America. It is arranged alphabetically, and the references to each name are placed in chronological order. Each name appears in this list as it is used in the reference cited. The references refer only to the more important descriptions of formations or discussions of correlation, synonymy, or nomenclature. The geologic time-division to which a formation belongs, and the State, Territory, or country in which it occurs, form a part of each entry.

(3) A list of the geographic names that have been applied to masses of igneous rocks occurring in North America. Only those names that indicate that the rocks are of igneous origin have been included in this list. All names of metamorphic or other rocks of uncertain origin are included in the list of sedimentary formation names.

(4) An index list of formation names.

At the inception of this work it was seen that it would be necessary to read carefully every article or book on geology that had been published in order to be certain that every name that had been used to designate particular strata should be included in this catalogue. It was evident that the necessity for an early completion of the work and the limited time that could be devoted to it rendered it impossible to adopt such a plan. Furthermore, it is well known that during the early years of geologic literature names were employed so loosely that in very many cases it is impossible to determine whether it was intended to use the name merely in a descriptive sense or as a distinctive formation name. It may happen, therefore, that names are included in this list which were not intended to be proposed as formation names, or that the first mention of a name subsequently used as a distinctive formation name has been omitted.

This work not only presents a list of formation names, and their synonymy and correlations as given by authors, but also serves as a bibliography of the literature describing each formation. Mere mentions of occurrence were not entered, but it was intended to include descriptions of a formation which defined it either wholly or in part. It is probably true that the discrimination as to what is a sufficient description to entitle the reference to be included in this catalogue has not been of such a uniform character as it would have been if the preparation of the catalogue had been wholly the work of one person; but it is not considered less valuable on this account, since all the really important descriptions are believed to have been included.

No attempt has been made to indicate the synonymy or taxonomic value of any formation except as it was given by the author of the reference cited. It is intended to refer the investigator to the literature of any North American geologic formation name, and he must exercise his own judgment as to its value and standing as a formation name.

The work of preparing this bulletin has been in progress for nearly three years. It has been interrupted from time to time by other office and field work of the author. During the winter of 1899–1900 it became evident that this work must be completed at once for the use of members of the United States Geological Survey in assigning names to the formations which were being delineated on the folios forming the Geologic Atlas of the United States. The Director of the Survey requested the following geologists to assist in completing the work: Messrs. M. R. Campbell, N. H. Darton, J. S. Diller, G. H. Girty, C. W. Hayes, F. H. Knowlton, F. L. Ransome, G. O. Smith, A. C. Spencer, T. W. Stanton, J. A. Taff, T. W. Vaughan, and David White. The literature that then remained to be examined was apportioned among these gentlemen, and since that time the material has been brought down to January 1, 1901, by the author. The methods of preparing this material, previously adopted, were followed with as much uniformity as was possible, and the author, as well as geologists in general, is greatly indebted to these gentlemen who assisted in bringing the work to an early completion.

In the discrimination of what constitutes a sufficient description of a formation and the determination of the problems of nomenclature, the following suggestions are offered. These represent, in brief, the conclusions of the author as the result of his studies of the geologic literature of North America.

A formation which is associated with other strata at the particular locality from which it takes its name should be defined, either by its lithologic or its faunal characters, in such a manner that the reader, or the observer in the field, can differentiate it from the other strata with which it occurs. Where a name is given to a series of strata of varied lithologic character and of wide distribution, the general characters of the lithologic variations and the stratigraphic relations should be so given as to indicate, approximately, what are its relations to other formations of the same or related provinces.

In determining the names to be applied to formations the laws of priority and prescription (general usage) should be observed. The name first given to a definite formation or series of strata should hold, unless this name is superseded in literature by another which has come into general use. In the latter case the first name should be dropped for this formation; and, where there can be no question as to the general usage of the subsequent name, the first name might be used again for a different formation without causing serious trouble. Such reuse would certainly be very advantageous in regions where there are few geographic names.

As an illustration, the name Berkshire limestone was first applied to certain limestones in western Massachusetts. Subsequently the name Stockbridge limestone was employed to designate this formation and has since come into general usage for this subdivision of the Cambrian in that region. The name Berkshire limestone has therefore become obsolete, and the name might be used to designate some other formation without creating confusion.

The duplication of formation names has become a serious matter, as will be seen from an examination of this list. It seems very desirable that in the future there should be no further duplication; new names should replace those which can not hold their present varied definitions; thus in time all the present discrepancies in the nomenclature of formations would disappear from geologic literature.

It is the intention of the writer to continue this list in the yearly publication, Bibliography and Index of North American Geology, etc., under the subheading, "Geologic formations described."

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SYNONYMIC TABLE OF PERIOD NAMES USED BY AUTHORS AND THOSE USED BY THE UNITED STATES GEOLOGICAL SURVEY.

Names used by authors.		United States Geological Survey classification.
Glacial		Pleistocene.
Quaternary		
Pleistocene		
Tertiary	Pliocene	Neocene.
	Miocene	
	Oligocene	Eocene.
	Eocene	
Cretaceous		Cretaceous.
Jura		Juratrias.
Trias		
Permian		Carboniferous.
Carboniferous		
Devonian		Devonian.
Silurian		Silurian.
Ordovician		
Cambrian		Cambrian.
Algonkian		Algonkian.
Archean		Archean.

LIST OF GEOLOGIC FORMATION NAMES, ARRANGED BY GEOGRAPHIC PROVINCES UNDER THE GEOLOGIC PERIODS TO WHICH THEY HAVE BEEN ASSIGNED.

PLEISTOCENE.

Alaska.

Cook Inlet.
Ground Ice.
Kanektok.
Kowak.
Kuskokwim.
Pinnacle.
St. Elias.
Saskachewan.
Togiak.
Yukon.

Appalachian region.

Teay.

Atlantic Coast region.

Barnstable.
Barrington.
Bryn Mawr.
Cape May.
Columbia.
Cornfield Harbor.
Jamesburg.
Middleboro.
Mohegan.
Mussel-bearing.
Packer.
Philadelphia.
Queens River.
Sankaty.
Simmons Bluff.
Terrace.
Tisbury.
Truro.
Yellow.

Canada.

Galt.
Leda.
Kingston.
Saugeen.
Saxicava.
Syrtensian.
Toronto.

Great Lakes region.

Albertan.
Algoma.
Arkona.
Artemisia.
Calumet Beach.
Gary.
Grassmere.
Mesabi.
Van Wert.
Wisconsin.

Great Plains region.

Antelope.
Cache Valley.
Equus.
Gentile Valley.
Kansan.
Lake Bonneville.
Malade Valley.
Marsh Creek.
McPherson.
Meade.
Megalonyx.
Salt Creek.
Third Moraine.
Wellington.

Gulf States.

Biloxi.
Mobile.
Port Hudson.

Mississippi Valley.

Aftonian.
Altamont.
Bluff.
Bottom Prairie.
Boulder.
Buchanan.
Cerro Gordo.
Delta.
Forest.
Fourth Moraine.
Gravel.
Highland.
Illinoian.
Iowan.
Iroquois.
Itasca.
Loess.
Marseilles.
Orange Sand.
Peorian.
Sangamon.
Shelbyville.
Silveria.
Tolleston.
Valley.
Valparaiso.
Vermilion.
Western Valley.
Yarmouth.

Pacific Coast region.

Admiralty.
Coos.
Douty.
Gale.
Midland.
Orting.

PLEISTOCENE—continued.

Osceola.
Puyallup.
San Pedro.
Steilacoom.
Superjacent.
Tehachipa.
Vashon.
Yakutat.

Rocky Mountain region.

Hot Spring.
Sheridan.
Stanford.

Southwestern region.

Coast.
Guertie.
Leona.
Prairie d'Ane.
Seymour.
White Prairie d'Ane.

West Indies.

Barbican.
Bogue Island.
Buff Bay.
Champlain.
Coastal.
Falmouth.
May Pen.
Montego.
Neudeckian.
Ozarkian.
Warren.
Zapata.

TERTIARY.

Alaska.

Hayes River.
Kenai.
Nulato.
Nushagak.
Orca.
Palisades.
Pinnacle.
Saskatchewan.
Tanana.
Tok.
Twelvemile.
Tyonek.
Unga.
Yakutat.
Yentna.

Appalachian region.

Flatwoods.
Hickman.
Irvine.

Atlantic Coast region.

Alachua.
Altamaha.
Alum Bluff.
Appomattox.
Aquia Creek.
Archer.
Ashley.
Aspalaga.
Autocene.
Beacon Hill.
Branditown.
Brandon.
Bryn Mawr.
Caloosahatchie.
Cape Cod.
Carolinian.
Chattahoochee.
Chesapeake.
Cooper River.
Coralline.
Croatan.
Duplin.
Eo-Lignitic.
Floridian.
Glassboro.
Gray.
Great Carolina.
Hawthorne.
Holocene.
Jacksonboro.
Lafayette.
Lisbon.
Manatee.
Marl.
Marlborough.
Marylandinian.
Mont Alto.
Mount Holly.
Nashaquitsa.
Orangeburg.
Pamunkey.
Patuxent.
Pensauken.
Piscataway.
Pulaski.
Santee.
Shark River.
Shell Bluff.
Squanjum.
Tuscahoma.
Vineyard.
Virginian.
Waccamaw.
Weyquosque.
Wilmington.
Woodstock.
Yellow.

Canada.

Carmanah Point.
Coldwater.
Lawrencian.
Leda.
Roche Percee.
Saxicava.
Sooke.
Tranquille.

Central America.

Brito.

Great Basin region.

Amyzon.
Bishop Mt.
Bitter Creek
Bridger.
Cache Lake.
Esmerelda.
Estuary.
Fort Bridger.
Green River.

TERTIARY—continued.

ldt.

liff.

ke.

e.

eat Lakes region.

lion.

eat Plains region.

lown.
rson.
nyx.
ca.
tte.
eras.
River.

Greenland.

Gulf States.

a.

anding.
Bluff.
one.
saw.
a.
rne.
n.
luff.
ield Ferry.

o.
-Davis.
ra.
e.
g.

Gulf.
and.
Landing.
etigbee.
n.

Jacksonian.
Jacksonville.
Lagarto.
Lignite.
Lignitic.
Lufkin.
Marine.
Matthews Landing.
Middleton.
Midway.
Midwayan.
Miliolite.
Moody's Branch.
Mount Selman.
Myrick.
Naheola.
Nanafalia.
Navasota.
Nummulite.
Oak Grove.
Oakville.
Ocala.
Ocheesee.
Orbitoides.
Orbitoitic.
Orbitolite.
Orthaulax.
Ostrea sellaeformis.
Palo Duro.
Pascagoula.
Peace Creek.
Queen City.
Reynosa.
Sabine River.
Shiloh.
Sopchophy.
Sparta.
St. Stephens.
Sucarnochee.
Tallahatta.
Tampa.
Timber Belt.
Tule.
Uvalde.
Vicksburg.
Vicksburgian.
Waldo.
Walnut.
Webb Bluff.
Wills Point.
Woods Bluff.

Yegua.
Zeuglodon.

Hawaii.

Pearl River.

Mexico.

Baucari.
Coatzacoalcos.
Trincheras.

Mississippi Valley.

Bloomfield.
Bluff.
Geneva.
La Grange.
Mansfield.
Orangesand.
Port Hudson.
Porters Creek.
Portland.
Quitman-Muerto.

Pacific Coast region.

Arago.
Asphalto.
Astoria.
Aturia.
Auriferous.
Bituminous.
Carmelo.
Carrizo Creek.
Chehalis.
Chico.
Coaledo.
Contra Costa.
Ellensburg.
Empire.
Ione.
John Day.
Johnson.
Kettleman.
Kittitas.
Little Vein.
Merced.
Miohippus.
Mojave.
Monterey.
Mytilus.
Oakland.
Ocoya Creek.

TERTIARY—continued.

Paso Robles.
Pescadero.
Puget.
San Diego.
San Pablo.
Santa Clara.
Sespe.
Similkameen.
Superjacent.
Swauk.
Tassagara.
Tejon.
Ticholeptus.
Torregon.
Tunnel Point.
Tuscan.
Tyre.
Roslyn.
Umpqua.
Wallala.
Wilbur.
Wildcat.

Rocky Mountain region.

Alnwick.
Arapahoe.
Bates Hole.
Bozeman.
Brontotherium.
Brown.
Browns Park.
Canyon.
Canyon City.
Coryphoden.
Cripple Creek.
Cuchara.
Deep River.
Denver.
Florissant.
Fort Ellis.
Fort Union.
Galisteo.
High Park.
Huerfano.
Intermediate.
Judith River.
Laramie.
Loup Fork.
Loup River.
Monument Creek.
North Park.
Nussbaum.
Oreodon.
Payette.
Pinon.
Pliohippus.
Poison Canyon.
Potosi rhyolite series.
Procamelus.
Puerco.
San Juan.
San Miguel.
Santa Fe.
Smith River.
Sphinx.
Sweetwater.
Titanotherium.
Wahsatch.
Washakie.
West Elk.
Wind River.
Wyoming.

Southwestern region.

Arkadelphia.
Basal.
Bingen.
Blanco.
Blanco Canyon.
Camden.
Cleveland County.
Cooks Mountain.
Fort Selden.
Hueco.
Lapara.
Llano Estacado.
Marks Mills.
Plateau.
White Bluff.

West Indies.

Antiguan.
Bowdan.
Cambridge.
Caroni.
Catadupa.
Chapelton.
Cobre.
Guallava.
Limon.
Manchionell.
Manzanilla.
Maruga.
Matanzas.
May Pen.
Moneague.
Moruga.
Naparima.
Nariva.
Oceanic.
Parian.
Pepino.
Porus.

CRETACEOUS.

Alaska.

Holikunk.
Kolmakof.
Matanuska.
Mission Creek.
Oklune.
Orca.
Tordrillo.

Appalachian region.

Brownstown.
Eagle.
Lisbon.
Marietta.

Atlantic Coast region.

Albirupean.
Amboy.
Aquia Creek.
Baltimorean.
Clay.
Eutaw.
Fish House.
Hazlet.
Island.
James River.
Lincoln.
Magothy.
Manasquan.
Marl.
Matawan.
Monmouth.
Mount Vernon.
Navesink.

CRETACEOUS—continued.

Patapsco.
Pedee.
Potomac.
Potters.
Rancocas.
Rappahannock.
Raritan.
Redbank.
Sand Hill.
Sassafras River.
Severn.
Sewell.
Vincentown.
Woodbridge.

Canada.

Belly River.
Clearwater.
Crosswicks.
Dunvegan.
Edmonton.
Fort St. John.
Grand Rapids.
Jackass Mountain.
Komooks.
Kootanie.
La Biche.
Loon River.
Nanaimo.
Nicollet.
Odanah.
Paskapoo.
Pelican.
Porcupine.
Queen Charlotte.
Quesnel River.
St. Marys.
Smoky River.
Tar.
Wapiti.
Willow Creek.

Great Basin region.

Bear River.
Black Butte.
Bluegate.
Golden Wall.
Henry's Fork.
Hogback.
Masuk.
Salt Wells.
Sulphur.
Tu-nunk.

Great Plains region

Arickaree.
Bad Land.
Barrett.
Belvidere.
Benton.
Beulah.
Black Hill.
Blue Cut.
Blue Hill.
Champion.
Cheyenne.
Corral.
Downs.
Elk Creek.
Fence-post.
Fort Hays.
Fort Pierre.
Fort Union.
Fullington.
Greenleaf.
Hay Creek.
Kiowa.
Kirby.
Lanphier.
Medicine.
Mentor.
Neocomian.
Oak Creek.
Osborne.
Platte.
Reeder.
Smoky Hill.
Stokes.
Trego.
Victoria.

Greenland.

Atane.
Kome.
Patoot.

Gulf States.

Arenaceous group.
Arietna.
Bayou Chicot.
Calcareous.
Coffee sand.
Prairie Bluff.
Ripley.
Tombigbee.
Tuscaloosa.
Winfield.

Mexico.

Cantera.
Timpas.
Todos Santos.

Mississippi Valley.

Fort Dodge.
Glauconitic.
Green sand.
Inoceramus.
Nishuabotany.
Rockville.
Rotten.
Woodbury.

Pacific Coast region.

Chico.
Chico-Tejon.
Foraminiferal.
Franciscan.
Golden Gate.
Horsetown.
Knoxville.
Mesa.
Myrtle.
Puget.
Radiolarian.
San Francisco.
Shasta.
Shasta-Chico.
Similkameen.
Suisure.
Superjacent.
Tejon.
Whitsett.
Winthrop.

Rocky Mountain region.

Animas River.
Apishapa.
Arapahoe.
Bull Mountain.
Canyon City.
Carlile.
Cascade.
Ceratops.

CRETACEOUS—continued.

Colorado.
Cretaceous Nos. 1, 2, 3.
Dakota.
Estuary.
Fort Benton.
Fox Hills.
Graneros.
Great Falls.
Green Mountain.
Greenhorn.
Halymenites.
Laramie.
Livingston.
Mancos.
Mesa Verde.
Middle Park.
Montana.
Niobrara.
Ohio Creek.
Pictured Cliff.
Pierre.
Piñon Mesa.
Point of Rocks.
Pteranodon.
Puerco.
Ruby.
Saliferous.
San Miguel.
Trinidad.
Yellowstone.

Southwestern region.

Anacacho.
Anoma.
Austin.
Big Decipher.
Black Prairie.
Bosque.
Buda.
Caprina.
Caprotina.
Chalky.
Choctaw.
Clark County.
Comanche.
Comanche Peak.
Comet Creek.
Coquina.
Dallas.
Danville.
Delrio.
Denison.
Dexter.
Dinosaur.
Duck Creek.
Eagle Ford.
Eagle Pass.
Edwards.
Escondido.
Etholen.
Exogyra arietina.
Exogyra costata.
Exogyra ponderosa.
Flag.
Fort Worth.
Fredericksburg.
Georgetown.
Gillespie.
Glen Rose.
Goodland.
Goodnight.
Grand Prairie.
Grayson.
Gulf.
Kiamitia.
Lower Cross Timbers.
Main Street.
Malone.
Marl Brook Columbus.
Navarro.
Nerinæa.
North Denison.
Paluxy.
Paw Paw.
Pinto.
Ponderosa.
Preston.
Pulliam.
Quitman.
Red River.
Requienia.
Richland-Gordon.
Rocky Comfort.
Shoal Creek.
Taylor.
Texana.
Texanan.
Timber Creek.
Travis Peak.
Trinity.
Tucumcari.
Upson.
Val Verde.
Vicarya.
Vola.
Walnut.
Washita.
Webberville.
Yucca.

West Indies.

Ballard.
Blue Mountain.
Frankenfield.
Jerusalem.
Logie Green.
Minbo.
Yallahs.

JURATRIAS.

Alaska

Naknek.
Skwentna.
Terra Cotta.

Atlantic Coast region

Albirupian.
Arundel.
Baltimorean.
Boscabel.
Brunswick.
Chesterfield.
Chicopee.
Connecticut River.
Granby.
Gwynedd.
Lansdale.
Lockatong.
Long Meadow
Mount Toby.
New Red.
Newark.
Otterdale.
Patuxent.
Perkasie.
Pleurocoelus.
Potomac.

JURATRIAS—continued.

Pottstown.
Red sand rock.
Seneca.
Stockton.
Sugarloaf.
Trap Tuff.
Tuckahoe.
Vinita.

Canada.

Nicola.
Vancouver.

Great Basin region.

Flaming Gorge.
Gray Cliff.
Koipato.
Shinarump.
Star Peak.
Vermilion.

Mexico.

Barranca.

Mississippi Valley.

Merom.

Pacific Coast region.

Auriferous slate.
Bicknell.
Cedar.
Foreman.
Franciscan.
Golden Gate.
Hardgrave.
Hinchman.
Hosselkus.
Mariposa.
Milton.
Mineral King.
Monte de Oro.
Mormon.
Pitt.
Radiolarian.
Sailor Canyon.
Santa Anna.
Swearinger.
Thompson.
Trail.

Rocky Mountain region.

Atlantosaurus.
Baptanodon.
Como.
Dolores.
Ellis.
Gunnison.
La Plata.
McElmo.
Meekoceras.
Morrison.
Pentacrinus.
Red.
Shirley.
Sundance.
Teton.
Unkpapa.
Wingate.
Wyoming.
Zuni.

Southwestern region.

Bend.
Dockum.
Lista Blanca.
Malone.
Norristown.

PERMIAN.

Appalachian region.

Dunkard Creek.

Great Plains region.

Abilene.
Alma.
Amphitheatre.
Big Basin.
Big Blue.
Browntown.
Cave Creek.
Cedar Hills.
Chapman.
Chase.
Cimarron.
Clear Fork.
Cottonwood.
Curzon.
Day Creek.
Dog Creek.
Double Mountain.
Dry Bone.
Flint.
Flint Hill.
Flower-pot.
Forest City.
Fort Riley.
Geronimo.
Geuda.
Glass Mountain.
Harpers.
Jenkins.
Kiger.
Kingfisher.
Manhattan.
Marietta.
Marion.
Medicine Lodge.
Neosho.
Red Bluff.
Salt Fork.
Salt Plain.
Shimer.
Sumner.
Taloga.
Wellington.
Wichita.
Wreford.

CARBONIFEROUS.

Alaska.

Cape Beaufort.
Tachatna.
Tahkandit.
Wellesley.

Appalachian region.

Alleghany River.
Alton.
Ames.
Anderson.
Anthracite.
Bakerstown.
Bangor.
Barren.
Barton.

CARBONIFEROUS—continued.

Bayard.
Bearwallow.
Beaver River.
Bedford.
Bee Spring.
Bellton.
Benezette.
Berea.
Big Clifty.
Big Injun.
Black Hand.
Blacksville.
Blackwater.
Birmingham.
Bluefield.
Bluestone.
Bolivar.
Bonair.
Bradford.
Braxton.
Breathitt.
Briceville.
Broad Top.
Browntown.
Brush Creek.
Buffalo.
Buhr.
Butler.
Cairo.
Cambridge.
Canaan.
Canal.
Cannelton.
Caseyville.
Cassville.
Charleston.
Clarion.
Clark.
Clarksburg.
Cleveland.
Coal measures.
Colvins Run.
Conemaugh
Conglomerate.
Connellsville.
Connoquenessing.
Corbin.
Corry.
Crawford.
Crinoidal.
Curlew.
Cussewago.
Cuyahoga.
Dismal.
Dotson.
Eagle.
Elk Lick.
Elk River.
Elkgarden.
Erie.
Ewuing.
Fairfax.
Fayette.
Federal Creek.
Ferriferous.
Fish Creek.
Fishpot.
Flint Ridge.
Floyd.
Fort Payne.
Freeport.
Frostburg.
Gallitzen.
Garland.
Gilmore.
Gladeville.
Great.
Great Conglomerate.
Green County.
Greenbrier
Griswold Gap.
Harlan.
Hartselle.
Hinton.
Homewood
Horsepen.
Iowa.
Irondale.
Johnson River.
Johnstown.
Jollytown.
Kanawha.
Kanawha Falls.
Kinzua.
Kittanning.
Lauderdale.
Lee.
Lehigh.
Leitchfield.
Licking.
Logan.
Lookout.
Lower Green.
Macksburg.
Madisonville.
Mahoning.
Marvin Creek.
Massilon.
Mauch Chunk.
Maxville.
Meadeville.
Mercer.
Middle Conglomerate.
Mill Creek.
Millstone.
Monongahela River.
Morgantown.
Mount Morris.
Mount Pleasant.
Mount Sand.
Mountain.
New River.
Newman.
Newtonville.
Nineveh.
Norton.
Oil Creek Lake.
Oil Lake.
Olean.
Olive.
Orangeville.
Oxmoor.
Panther Creek.
Pennington.
Pennsylvanian.
Pickens.
Pine Creek.
Pine Mountain.
Pithole.
Pittsburg.
Pocahontas.
Pocono.
Pomeroy.
Ponent.
Pottsville.
Powelton.
Price.
Princeton.
Productive.
Pulaski.
Putnam Hill
Quakertown.
Quinnemont.
Raccoon.
Raleigh.
Redstone.

CARBONIFEROUS—continued.

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Conanicut.
Cranston.
Kingstown.
Millers River.
Natick.
Pawtucket.
Pelham.
Pondville.
Purgaton.
Rose Island.
Roxbury.
Sachuest.
Sockanosset.
Sukonk.
Tenmile River.
Tiverton.
Wamsutta.

Canada.

Albert.
Banff.
Bonaventure.
Cache Creek.
Campbell Creek.
Cape John.
Cascade.
Hopewell.
Marble Canyon.
Mertgomist.
New Glasgow.
Perry.
Pictou.
Portland.
Riversdale.
Smalls Brook.
Smelt Brook.
Stellarton.
Union.
Windsor.
Woodstock.

Great Basin region.

Aubrey.
Godiva.
Diamond Peak.
Humbug.
Lodore.
Mammoth.
Red Wall.
Wahsatch.
Weber.

Great Lakes region.

Coldwater.
Grand Rapids.
Marshall.
Michigan salt.
Napoleon.
Parma.
Richmondville.
Rock Falls.
Woodville.

Great Plains region.

Altoona.
Americus.
Atchison.
Auburn.
Bethany Falls.
Burlingame.
Calhoun.
Carlyle.
Cave.
Cave Rock.
Cave Spring.
Chanute.
Chase.
Cherryvale.
Cottonwood.
Cottonwood Falls.
Deer Creek.
Douglas.
Dover.
Dun.
Dunlap.
Earlton.
Einstine.
Elgin.
Elk Falls.
Elmont.
Emporia.
Falls River.
Florence.
Fort Scott.
Garnett.
Gypsum.
Hartford.
Howard.
Iola.
Labette.
Lane.
Le Compton.
Le Roy.

CARBONIFEROUS—continued.

Marion.
Marmaton.
Maryville.
Neodesha.
Oread.
Osage.
Osage City.
Oswego.
Ottawa.
Pawnee.
Plattsburg.
Pleasanton.
Pottawatomie.
Robinett.
Rossville.
Sea Urchin.
Severy.
Shunganunga.
Silver Lake.
Soldier Creek.
Spring Rock.
Stanton.
Strong.
Swallow.
Syntrialasina.
Tecumseh.
Thayer.
Topeka.
Toronto.
Victoria.
Vilas.
Wabaunsee.
Wakarusa.
Well Rock.
Willard.
Winfield.

Mississippi Valley.

Anvil Rock.
Appanoose.
Archimedes.
Ardmore.
Augusta.
Aux Vases.
Baden.
Bevier.
Bituminous.
Burlington.
Carlinville.
Chaelites.
Chariton.
Cherokee.
Chester.
Chouteau.
Clepsydrops.
Collinsville.
Concretionary.
Cooper.
Coxville.
Cypress.
Dekalb.
Earlham.
Encrinital.
English River.
Ferruginous.
Forbes.
Fragmental.
Fusulina.
Geode.
Goniatite.
Grand River.
Graydon.
Graydon Springs.
Hanging Rock.
Hannibal.
Harrodsburg.
Henrietta.
High Rock.
Jonesboro.
Kansas City.
Kaskaskia.
Keokuk.
Keosauqua.
Kinderhook.
Knob.
Knobstone.
Lady Washington.
Lagonda.
Lawrence.
Lawrence-Crawford.
Le Grand.
Lithographic.
Livingston.
Louisiana.
Macon City.
Mansfield.
Maple Hill.
Marais des Cygnes.
Marshalltown.
Merom.
Miller.
Mississippian.
Missouri.
Missourian.
Mitchell.
Moberly.
Monroe-Harrison.
Mound Valley.
North Vernon.
Orange Martin.
Nodaway.
Parkville.
Pella.
Platte.
Plattsmouth.
Pottery.
Productal.
Quarry Creek.
Quitman.
Redrock.
Rhomboidal.
Riverside.
Rock Creek.
Rockcastle.
Rockford.
St. Genevieve.
St. Joe.
St. Louis.
Salem.
Spring River.
Springvale.
Summit.
Thomas Hill.
Unionville.
Warrensburg.
Warsaw.
Wassonville.
West Franklin.
Westerville.
Weston.
Winterset.
Wyckoff.

Pacific Coast region.

Baird.
Bed Rock.
Blue Canyon.
Calaveras.
Cape Horn.
Clipper Gap.
Delhi.
Eureka.
Little Grizzly Creek.
McCloud.
Martinez.
Pitt.
Relief.
Robinson.
Shoo Fly.

Rocky Mountain region.

Arkansas.
Badito.

CARBONIFEROUS—continued.

Blue.
Castle.
Eryops.
Fountain.
Hermosa.
Kibbey.
Leadville.
Madison.
Maroon.
Millsap.
Monarch.
Otter.
Otter Creek.
Paine.
Quadrant.
Rico.
Wood River.
Woodhurst.

Southwestern region.

Adams Branch.
Albany.
Antelope Creek.
Appleton.
Atoka.
Batesville.
Bead Mountain.
Belva.
Bend.
Big Valley.
Boggy.
Boone.
Booneville.
Boston group.
Brown Creek.
Brownwood.
Buffalo Creek.
Bull Creek.
Burnet Branch.
Camp Colorado.
Camp Creek.
Campophyllum.
Canyon.
Carrollton.
Cavaniol.
Cedarton.
Chaffin.
Cherry.
Cisco.
Coleman.
Coon Mountain.
Cottonwood Creek
Cross Plains.
Elliott Creek.
Elm Creek.
Fayetteville.
Fox Ford.
Frickham.
Genevieve.
Granville.
Grape Creek.
Greenwood.
Hanna Valley.
Hartshorne.
Hartwell.
Hog Creek.
Home Creek.
Hordes Creek.
Horse Creek.
Indian Creek.
Jagger Bend.
Kessler.
Lohn.
Lost Creek.
Lynch Creek.
McAlester.
Milburn.
Milburn-Strawn.
Norristown.
Novaculite.
Paint Rock.
Parks Mountain.
Pawhuski.
Pentremital.
Poteau.
Richland.
Ricker.
Rochelle.
Rough Creek.
Russellville.
Saddle Creek.
Santa Anna.
Savanna.
Sebastian.
Shadrick Mill.
Shoal Creek.
Spadra.
Speck Mountain.
Spring Creek.
Stockwether.
Strawn.
Sylamore.
Talpa.
Thurman.
Tomlinson.
Valera Bend.
Waldrip.
Washburn.
Washington.
Watts Creek.
Wilbarger Creek.
Wyman.

DEVONIAN.

Alaska.

Tachatna.
Tahkandit.
Wellesley.
West Fork.

Appalachian region.

Allegrippus.
Becraft.
Bellvale.
Bernardston.
Black shale.
Blossburg.
Burlington.
Cadent.
Camden.
Cardiola.
Cascade.
Cashaqua.
Catskill.
Cauda-Galli.
Chapman.
Chattanooga.
Chautauquan.
Chemung.
Cherry Ridge.
Cleveland.
Coeymans.
Columbus.
Corniferous.
Cuboides.
Delaware.
Dellville.
Dorset.
Elk.
Elk Mountain
Ellicottsville.
Encrinal.
Erian.
Erie.
Esopus.
Falls Creek.

DEVONIAN—continued.

Flagstone.
Frog Mountain.
Gardeau.
Genesee.
Girard.
Grainger.
Great Bend.
Green Pond.
Hamilton.
Helderberg.
Helderbergian.
Honesdale.
Hosmer.
Ithaca.
Jennings.
Kimberling.
Kings Mill.
Lackawaxen.
Leboeuf.
Little Genesee
Louisville.
Ludlowville.
McKean.
Manlius.
Marcellus.
Montebello.
Monterey.
Montrose.
Moscow.
Mount Pleasant.
Naples.
New Milford.
New Scotland.
Nunda.
Ohio.
Old Red.
Olentangy.
Oneonta.
Onondaga.
Oriskany.
Panama.
Panola.
Perry.
Peru.
Ponent.
Portage.
Postmeridial.
Romney.
Salamanca.
Sandusky.
Schoharie.
Scioto.
Selinsgrove.
Seneca.
Senecan.
Sherburne.
Skaneateles.
Skunnemunk.
Stafford.
Starucca.
Stony Brook.
Stormville.
Styliolina.
Sweetland.
Tentaculite.
Towanda.
Tully.
Tuna.
Ulsterian.
Venango.
Vergent.
West Jefferson.
Wolf Creek.

Canada.

Bloomsbury.
Gaspe.
Intermediate.
Kingston.
Lambton.
Little River.
Manitoban.
Mispec.
Winnipegosan.

Great Basin region

Nevada.
Ogden.
Temple Butte.
White Pine.

Great Lakes region.

Dundee.
Little Traverse Bay.
St. Clair.
Thunder Bay.
Traverse.

Mississippi Valley.

Brown.
Bunker Hill.
Callaway.
Cedar Valley.
Clear Creek.
Davenport.
Delphi.
Fayette.
Grand Tower.
Grassy Creek.
Gyroceras.
Hackberry.
Hannibal.
Huron.
Independence.
Kenwood.
Kinderhook.
King.
Lime Creek.
Louisian.
Louisville-Delphi.
Montpelier.
New Albany.
New Providence.
North Vernon.
Otis.
Phelps.
Riverside.
Rockford.
Sac.
Sellersburg.
Shelby.
Snyder Creek.
Spirifera pennata.
State Quarry.
Sylamore.
Vernicular.
Walker Block.
Wapsipinicon.
Warren.

New England.

Moose Island.
Moose River.
Newport.
Paupack.

Pacific Coast region.

Arlington.
Kennett.
Sacramento.

Rocky Mountain region.

Jefferson.
Monarch.
Ouray.
Parting.
Three Forks.

Southwestern region.

Eureka.

SILURIAN.

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Mifflintown.
Moccasin.
Monclova.
Monterey.
Montgomery.
Neeleytown.
Niagara.
Niagaran.
Oneida.
Onondaga.
Oswegan.
Oswego.
Panola.
Pentamerus.
Postmeridian.
Poxono Island.
Pre-Meridian.
Primedidial.
Proteau.
Red Mountain.
Rensselaer.
Rockwood.
Rondout.
Salina.
Salmon River.
Scalent.
Scutella.
Shawangunk.
Siliceous.
Sneedville.
Springfield.
Stormville.
Surgent.
Taylors Ridge.
Tellico.
Tuscarora.
Tymochtee.
Waldron.
Waterlime.
West Union.
White Oak Mountain.

Canada.

Anticosti.
Arisaig.
Bertie.
Cayuga.
Cobequid.
Gaspe.
Guelph.
Halysites.
Mascarene.

Great Basin region.

Eureka.
Lone Mountain.

Great Lakes region.

Byron.
Coralline.
Gray.
Mayville.
Monroe.
Racine.
Sylvania.
Waukesha.

Mississippi Valley.

Anamosa.
Bertram.
Bowling Green.
Cape Girardeau.
Clear Creek.
Coggan.
Coral.
Glencoe.
Gower.
Grand Tower.
Joliet.
Laurel.
Le Claire.
Noix.
Osgood.

New England.

Amherst.
Aroostook.
Ashland.
Bellowspipe.
Brimfield.
Cobscook.
Greylock.
Sheridan.
Vinal Haven.
Whitmores Ferry.

Pacific Coast region.

Grizzly.
Taylorsville.

Rocky Mountain region.

Parting.
White.
Yule.

SILURIAN—continued.

Southwestern region.

Beaver.
Burnet.
Cason.
Deep Creek.
Glens Falls.
Hinton.
Hoover.
Izard.
Leon.
St. Clair.
San Saba.
Wyo.

ORDOVICIAN.

Appalachian region.

Auroral.
Avondale.
Barnegate.
Beekmantown.
Belfast.
Berkshire.
Bird Mountain.
Birdseye.
Black River.
Calciferous.
Canadian.
Capitol.
Carters Creek.
Central.
Champlain.
Chazy.
Chester Valley.
Chickamauga.
Cincinnati.
Codorus.
College Hill.
Conasauga.
Dayton.
Eolian.
Everett.
Flanagan.
Fossiliferous.
Frankfort.
Glade.
Hudson.
Hudson River.
Inwood.
Isle Lamotte.
Kentucky.
Knox.
Lancaster.
Lebanon.
Lenoir.
Lorraine.
Manhattan.
Martinsburg.
Matinal.
Moduria.
Mohawk.
Mohawkian.
Nashville.
Normandy.
Ontarian.
Ontaric.
Ontario.
Peach Bottom.
Pelham.
Pierce.
Point Pleasant.
Ridley.
Rochdale.
Rockmart.
Sevier.
Shenandoah.
Siliceous.
Sparry.
Stones River.
Trenton.
Utica.
Wappinger Valley.
Westfield.
Whateley.
Winchester.

Canada.

Cat Head.
Citadel.
Farnham.
Lauzon.
Levis.
Marsouin.
Mottled.
Phillipsburg.
Quebec.
St. Jean.
Winnipeg.

Great Basin region.

Pogonip.
Ute.

Great Lakes region.

Bluff.
Eastern.
Elevator.
Jordan.
Lake Superior.
St. Croix.
St. Lawrence.
St. Peters.

Mississippi Valley.

Beloit.
Bryant.
Buff.
Buffalo.
Cap-au-Grés.
Charette.
Crystal.
Folley.
Galena.
Girardeau.
Joachim.
McCum.
Magnesian.
Maquoketa.
Marble.
Marble Hill.
Receptaculites.
Richmond.
St. François.
St. Thomas.
Sandstone.
Shakopee.
Thebes.
Willow River.
Wykoff.

New England.

Canaan.
Chester.
Conway.
Egremont.
Goshen.
Granville.
Hardwick.
Hawley.
Hoosac.

ORDOVICIAN—continued.

Leyden.
Riga.
Rowe.
Savoy.
Mount Washington.
Waterville.

Rocky Mountain region.

Fremont.
Harding.
Madison.
Manitou.

Southwestern region.

Macluria.
Polk Bayou.
Rainy Mountain.
Saccharoidal.
St. Clair.

CAMBRIAN.

Appalachian region.

Aldrich.
Antietam.
Apison.
Ashley Hill.
Beaver.
Chikis.
Chilhowee.
Chiques.
Cochran.
Cohulta.
Coosa.
Deer Creek.
Graysonton.
Hampton.
Hardistonville.
Harpers.
Harpers Ferry.
Hellem.
Hesse.
Honaker.
Kentucky.
Knox.
Loudon.
Maryville.
Montevallo.
Murray.
Nebo.
Nichols.
Nolichucky.
North Valley Hill.
Oostanala.
Potsdam.
Primal.
Reading.
Rogersville.
Rome.
Russell.
Rutledge.
Sandsuck.
Shenandoah.
South Valley Hill.
Starr.
Unicoi.
Wallkill.
Wappinger Valley.
Weisner.
Weverton.
Wiltons Run.
York.

Canada.

Acadian.
Adams Lake.
Athabasca.
Barachois.
Belle Isle.
Bow River.
Bretonian.
Castle Mountain.
Churchill.
Copper-bearing.
Etcheminian.
Johannian.
Kaministiquia.
Nisconlith.
Phillipsburg.
Pointe Levis.
Quebec.
St. John.
Selkirk.
Sillery.

Great Basin region.

Hamburg.
Prospect Mountain.
Secret Canyon.
Tintic.
Tonto.

Great Lakes region.

Eastern.
Eau Claire.
Fond du Lac.
Hermansville.
Keweenawan.
Lake Superior.
Mendota.

Mississippi Valley.

Cole Camp.
Crystal City.
Dresbach.
Elevator B.
Fredericktown.
Gasconade.
Grand Portage.
Gritstone.
Hinckley.
Jordan.
La Motte.
Le Seur.
Moreau.
New Richmond.
Pipestone.
Pokegama.
Potosi.
Proctor.
Puckwunge.
Roubidoux.
St. Croix.
St. François.
St. Joseph.
St. Lawrence.
Waswangoning.
Western.
White River.

New England.

Becket.
Berkshire.
Cheshire.
Coos.
Dalton.
Eolian.
Georgia.
Granular.
Kendall Green.
Lincoln.

CAMBRIAN—continued.

Lingua.
Little Compton.
Monson.
Nahant.
Newport Neck.
Pelham.
Poughquag.
Quartzrock.
St. Albans.
Stockbridge.
Stony Brook.
Swiftwater.
Taconic.
Taconyte.
Vermont.
Winooski.

Rocky Mountain region.

Barker.
Dry Creek.
Flathead.
Gallatin.
Meagher.
Park.
Pilgrim.
Sawatch.
Yogo.

Southwestern region.

Blue Creek.
Hickory.
Katemcy.
Ozark.
Riley.

ALGONKIAN.

Appalachian region.

Catoctin.
Citico.
Courtland.
Edison.
Franklin.
Hamburg Mountain.
Hazel.
Hemlock.
Losee Pond.
Manhattan.
Monroe.
Pigeon.
Sandpond.
Taconic.
Talladega.
Thunderhead.
Wilhite.

Canada.

Anorthosite.
Aspidella.
Avalon.
Conception.
Huronian.
Kaministiquia.
Kingston.
Momable.
Ontarian.
Random.
Signal Hill.
Thessalon.
Torbay.

Great Lakes region.

Ajibik.
Antoine.
Baraboo.
Bijiki.
lack River Falls.
emia.
Bone Lake.
Chippewa.
Clarksburg.
Eastern.
Felch Mountain.
Goodrich.
Groveland.
Hanbury.
Ishpeming.
Kona.
Mansfield.
Maquethian.
Marquette.
Marquette-Menominee.
Marquettian.
Menominee.
Mesnard.
Michigamme.
Mount Mesnard.
Negaunee.
Ogishke.
Penokee.
Penokee-Gogebic.
Quartz slate.
Randville.
St. Louis.
Siamo.
Stuntz.
Sturgeon.
Thompson.
Vulcan.
Wewe.

Great Basin region.

Chuar.
Grand Canyon.
Unkar.
Vishnu.

Mississippi Valley.

Pilot Knob.
Sioux.

New England.

Ashton.
Blackstone.
Coles Brook.
Cumberland.
East Lee.
Goose Pond.
Hinsdale.
Hop Brook.
Kearsarge.
Mendon.
Merrimack.
Mount Holly.
Rockingham.
Smithfield.
Stamford.
Tyringham.
Washington.
White Mountain.

Rocky Mountain region.

Belt.
Chamberlin.
Cherry Creek.
Empire.
Greyson.
Helena.
Marsh.
Neihart.
Newland.
Salida.
Sheridan.
Spokane.

Southwestern region.

Llano.
Mason.
Packsaddle.
Texan.
Texian.

ARCHEAN.

hian region.

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Great Lakes region.

Animikie.
Clover Canyon.
Glacian.
Holyoke.
Kewatin.
Keweenawan.
Keweenian.
Kewenan.
Kitchi.
Mareniscan.
Minnesota River Valley.
Mona.
Necedah.
Ophian.
Palmer.
Pelodian.
Porphyrian.
Portland.
Quinnesec.
Republic.
Siderian.
Vermilion.
Waterloo.

Mexico.

Volcan.

New England.

Atlantic.
Franconia.
Greylock.
Labrador.
Labradorian.
Lake Winnepesaukee.
Lisbon.
Lyman.
Montalban.
Pemigewassett.
Pequawket.
Terranovan.
Worcester.

Southwestern region.

Bodeville.
Burnetan.
Click.
Fernandan.
Long Grove.
Long Mountain.
Iron Mountain.
Valley Spring.

FORMATIONS OF UNDETERMINED AGE.

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hian region.

Cades.
Cherokee slates.
Clingman.
Cockeysville.
Conshohocken.
Cortlandt.
Eaton.
Fairmount.
Frankford.
Kennett.
Kings Mountain.
Linnville.
Moose Hide.
New York.
Ocoee.
Oswegatchie.
Peach Bottom.
Pope Hollow.
Setters.
Yonkers.

Canada.

Anderson River.
Boston Bar.

Caribou.
George River.
Hunker.
Indian River.
Manitounuck.
Menevian.
Mott Haven.
Nechacco.
Nipigon.
Sault St. Mary.

Great Basin region.

Arizonian.
Mesa.
Red Creek.

Great Lakes region.

Cupriferous.
L'Anse.
Logan.
Mackinac.
New Ulm.

FORMATIONS OF UNDETERMINED AGE—continued.

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Pine Creek.
Putnamville.
St. Anthony.
Sedalia.
Williamsport.

New England.

Bar Harbor.
Bartletts Island.
Blanford.
Bolton.
Calderwood Neck.
Cambridge.
Chitistone.
Chloritic.
Cranberry Island.
Greenwich.
Klutena.
Kotlo.
Lake.
Mapleton.

Phipsburg.
Schooner Head.
Suttons Island.
Swanton.
Taunton.
Winnepesaukee.

Pacific Coast region.

Tolenas.
Ventura.

Rocky Mountain region.

Minnelusa.
Nampa.

Southwestern region.

Plymouth.
Polk County.

West Indies.

Caribbean.

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Carboniferous. Iowa. Included in Mississippian series. Includes Warsaw shales and limestone, Keokuk, Upper and Lower Burlington limestones. Exact Syns. Burlington and Keokuk. Osage. Part. syn. Encrinital limestone.

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Carboniferous. Missouri. Included in Mississippian series. Exact Syn. Osage.

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Carboniferous. Mississippi Valley. Part. syn. Osage.

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Tertiary. California. Included in Miocene?

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Silurian. Pennsylvania. Exact Syn. Magnesian or No. II.

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Cretaceous. Texas. Included in Upper Cretaceous.

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Cretaceous. Texas. Included in Black Prairie series.

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Cretaceous. Texas. Included in Black Prairie series.

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Cretaceous. Texas. Included in Washita division of Comanche series.

Austin formation, White. U. S. Geol. Surv., Bull., No. 82, p. 123. 1891.
Cretaceous. Texas.

Austin marble, Taff. Texas Geol. Surv., 3d Ann. Rept., pp. 343–344. 1892.
Cretaceous. Texas. Included in Fredericksburg division of Lower Cretaceous.

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Cretaceous. Texas. Included in Upper Cretaceous.

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Cretaceous. Texas. Included in Upper Cretaceous.

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Tertiary. New England.

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Carboniferous. Missouri. Included in Kaskaskia stage. Exact syn. Ferruginous sandstone.

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Algonkian. Newfoundland. Includes Signal Hill, Momable, Tarhay, and Conception.

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Silurian. Pennsylvania. Included in Siluro-Cambrian.

Baden sandstone, Wheeler. St. Louis Acad. Sci., Trans., vol. vii, p. 125. 1895.

Carboniferous. Missouri. Exact Syn. Ferruginous sandstone of early writers.

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Cretaceous. Colorado. Exact Syn. Puerco marl.

Badito formation, Hills. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 68. 1900.

Carboniferous? Colorado.

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Carboniferous. California. Included in McCloud formation.

Bakerstown sandstone, White. 2d Pa. Geol. Surv., Rept. Q, p. 307. 1878.

Carboniferous. Pennsylvania.

Ballard, Hill. Harvard Coll. Mus. of Comp. Zool., Bull., vol. xxxiv, p. 42. 1899.

Cretaceous. Jamaica. Included in Blue Mountain series.

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Jurassic? Maryland.

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Cretaceous. Maryland. Part. syn. Potomac (?).

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Carboniferous. Canada. Included in Lower Carboniferous or possibly Upper Devonian. Includes Upper Banff shales, Upper Banff limestone, Lower Banff shales, Lower Banff limestone. Exact Syn. Banff limestone.

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Carboniferous. *Alabama, Tennessee.* Exact Syn. Mountain limestone.

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Carboniferous. Alabama. Included in Mississippian series.

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Carboniferous. Alabama. Included in Lower Carboniferous.

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Carboniferous. Alabama. Included in Upper Sub-Carboniferous.

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Jurassic. Wyoming.

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Algonkian. Lake Superior region. Included in Huronian.

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Algonkian. Wisconsin. Included in Upper Huronian.

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Cambrian. Nova Scotia.

Barbican, Hill. Harvard Coll. Mus. of Comp. Zool., Bull., vol. xxxiv, p. 42. 1899.
Pleistocene. Jamaica. Included in Coastal series.

Bar Harbor series, Shaler. U. S. Geol. Surv., 8th Ann. Rept., pt. ii, p. 1047. 1889.
Maine.

Barker formation, Weed. U. S. Geol. Surv., Geol. Atlas of U. S., Folios Nos. 55, 56. 1899.
Cambrian. Montana. Part. syn. Flathead and Gallatin formations.

Barnegat limestone, Mather. Geol. Surv. of N. Y., 2d Ann. Rept., pp. 168–169 1838.
New York.

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Silurian. New York. Included in Calciferous group.

Barnstable series, Shaler. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, pp. 539–541. 1898.
Pleistocene? Massachusetts. Included in Cape Cod series.

Barranca division, Dumble. Am. Inst. Mg. Engrs., Trans., vol. xxix, p. 139. 1900.
Included in Trias. Mexico.

Barree, White. 2d Pa. Geol. Surv., Rept. T^3, pp. 132–133. 1885.
Silurian. Pennsylvania. Exact. Syn. Niagara?

Barree group, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, pp. 825–827. 1892.
Silurian. Pennsylvania. Included in No. v, Clinton.

Barren group, Upper, Rogers. Geol. of Pa., vol. ii, p. 20 et seq. 1858.
Carboniferous. Pennsylvania.

Barren group, Lower, Rogers. Geol. of Pa., vol. ii, p. 17 et. seq. 1858.
Carboniferous. Pennsylvania.

Barren limestone, Owen. Geol. Reconn. State of Indiana, Rept. (1837), p. 22. 1859.
Indiana.

Barren group, Killebrew and Safford. Resources of Tennessee, p. 40. 1874.
Carboniferous. Tennessee. Included in Lower Carboniferous.

Barren Coal Measures, Newberry. Ohio Geol. Surv., vol. ii, p. 155. 1874.
Carboniferous. Ohio. Included in Lower Coal Measures.

Barren group, Upper, Stevenson. Am. Phil. Soc., Proc., vol. xiv, p. 372. 1875.
Carboniferous. West Virginia. Included in Coal Measures.

Barren group, Lower, Stevenson. Am. Phil. Soc., Proc., vol. xiv, p. 391. 1875.
Carboniferous. West Virginia. Included in Lower Carboniferous.

Barren group, Upper, White. Lyceum of Nat. Hist. of N. Y., Annals, vol. xi, pp. 46–57. 1876.
West Virginia, Pennsylvania.

Barren Measures, Upper, Stevenson. 2d Pa. Geol. Surv., Rept. K, pp. 34–56. 1876.
Carboniferous. Pennsylvania. Includes Washington and Green Counties groups.

Barren series, Lower, Stevenson. 2d Pa. Geol. Surv., Rept. K, pp. 75–83. 1876.
Carboniferous. Pennsylvania. Includes Morgantown sandstone, Birmingham shale.

Barren series, Lower, White. 2d Pa. Geol. Surv., Rept. A^2, pp. 23–26. 1877.
Carboniferous. Pennsylvania.

Barren series, Upper, Stevenson. 2d Pa. Geol. Surv., Rept. K^2, pp. 25–29. 1877.
Carboniferous. Pennsylvania.

Barren series, Lower, Stevenson. 2d Pa. Geol. Surv., Rept. K^2, pp. 64–72. 1877.
Carboniferous. Pennsylvania. Includes Barton group.

Barren Measures, Lower, Newberry. Ohio Geol. Surv., vol. iii, p. 723. 1878.
Carboniferous. Ohio. Included in Coal Measures.

Barren Measures, Platt. 2d Pa. Geol. Surv., Rept. H^4, pp. 167–174. 1878.
Carboniferous. Pennsylvania.

Barren series, Lower, Stevenson. 2d Pa. Geol. Surv., Rept. K^3, pp. 18–26. 1878.
Carboniferous. Pennsylvania.

Barren Group, Lower, Stevenson. Ohio Geol. Surv., vol. iii, pp. 203, 221. 1878.
Carboniferous. Ohio. Included in Coal Measures.

Barren series, Lower, White. 2d Pa. Geol. Surv., Rept. Q, pp. 23–38. 1878.
Carboniferous. Pennsylvania. Includes Pittsburg limestone, Morgantown sandstone, Elk Lick limestone, Pine Creek limestone, Buffalo sandstone, Brush Creek limestone.

Barren Measures, Chance. 2d Pa. Geol. Surv., Rept. V, pp. 13–15. 1879.
Carboniferous. Pennsylvania.

Barren Measures, Platt. 2d Pa. Geol. Surv., Rept. H^5, p. 311. 1880.
Carboniferous. Pennsylvania.

Barren group, Upper, Stevenson. The Virginias, vol. ii, p. 70. 1881.
Carboniferous. West Virginia. Included in Coal Measures.

Barren group, Lower, Stevenson. The Virginias, vol. ii, pp. 98, 122. 1881.
Carboniferous. West Virginia.

Barren Measures, Lower, Platt. 2d Pa. Geol. Surv., Rept. H^6, pp. xxviii–xxix. 1881.
Carboniferous. Pennsylvania.

Barren Coal Measures, White. 2d Pa. Geol. Surv., Rept. T^3, pp. 48 et seq. 1885.
Carboniferous. Pennsylvania.

Barren Measures, D'Invilliers. 2d Pa. Geol. Surv., Ann. Rept. 1885, pp. 177–181. 1886.
Carboniferous. Pennsylvania. Includes Connellsville and Morgantown sandstones. Crinoidal limestone No. 19.

Barren Measures, D'Invilliers. 2d Pa. Geol. Surv., Ann. Rept. 1886, pp. 74–79, 208, 265, 295–296. 1887.
Carboniferous. Pennsylvania. Exact Syn. Pittsburg series.

Barren Measures, Upper, D'Invilliers. 2d Pa. Geol. Surv., Ann. Rept. 1886, pp. 58–63, 202–206, 262–263, 234–336. 1887.
Carboniferous. Pennsylvania. Includes Green County group and Washington County group.

Barren Measures, Upper. Carll. 2d Pa. Geol. Surv., Rept. I^5, p. 122. 1890.
Carboniferous. Pennsylvania. Exact Syn. Washington County group.

Barren Measures, Lower. Carll. 2d Pa. Geol. Surv., Rept. I^5, pp. 123–125. 1890.
Includes Crinoidal limestone = Ames limestone of Ohio and West Virginia. Exact Syn. Pittsburg series.

Barren Measures, White. U. S. Geol. Surv., Bull., No. 65, p. 70. 1891.
Carboniferous. Ohio, Pennsylvania, West Virginia. Exact Syn. Elk River series.

Barren Measures. D'Invilliers. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. ii, pp. 2406–2447. 1895.
Carboniferous. Pennsylvania. Exact Syn. No. xiv, Pittsburg series, Elk River series of West Virginia.

Barren Measures, Upper. D'Invilliers. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. ii, pp. 2565–2588. 1895.
Carboniferous. Pennsylvania. Includes Green County group, Washington County group.
Exact Syns. No. xvi, Permo-Carboniferous or Dunkard Creek series.

Barrett shales. Jenney. U. S. Geol. Surv., 19th Ann. Rept., pt. ii, pp. 568–587, 593. 1899.
Cretaceous. South Dakota. Included in Dakota group.

Barrett shales. Ward. U. S. Geol. Surv., 19th Ann. Rept., pt. ii, p. 593. 1899.
Cretaceous. South Dakota.

Barrington clays. Woodworth. U. S. Geol. Surv., 17th Ann. Rept. pt. i, p. 987. 1896.
Pleistocene. Rhode Island.

Bartletts Island series. Shaler. U. S. Geol. Surv., 8th Ann. Rept., pt. ii, p. 1038. 1889.
Maine.

Barton group. Stevenson. 2d Pa. Geol. Surv., Rept. K^3, pp. 67–68. 1877.
Carboniferous. Pennsylvania. Included in Lower Barren series.

Basal clays. Dumble. Texas Geol. Surv., 1st Ann. Rept., pl. iii, pp. xli–xliv. 1890.
Tertiary. Texas. Included in Eocene.

Bashi deposit. Heilprin. Phil. Acad. Nat. Sci., Jour., vol. ix, pp. 140, 144. 1884.
Tertiary. Alabama. Included in Eocene. Exact Syn. Eolignitic.

Bashi series. Smith and Johnson. U. S. Geol. Surv., Bull. No. 43, p. 43. 1887.
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Bashi. Langdon. Geol. Soc. Am., Bull., vol. ii, pp. 588, 596. 1891.
Tertiary. Alabama. Included in Lower Eocene.

Bashi series. Langdon. Ga. Geol. Surv., 1st Rept. of Prog., p. 96. 1891.
Tertiary. Georgia. Exact syn. Woods Bluff series.

Bashi division. Spencer. Geol. Surv. Ga., 1st Rept. of Prog., 1890–91. 1891.
Tertiary. Georgia. Included in Lignitic.

Bashi series. Dall. U. S. Geol. Surv., 18th Ann. Rept. pt. ii, p. 345. 1898.
Tertiary. Alabama. Included in Eocene. Exact Syn. Woods Bluff series.

Bastard limestone. White. 2d Pa. Geol. Surv., Rept. G^7, pp. 97–98. 1883.
Silurian. Pennsylvania. Included in Lower Helderberg, or No. VI.

Bastard limestone. Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, p. 948. 1892.
Silurian. Pennsylvania. Included in No. VI. Stormville series.

Bates Hole formation. Smith. Jour. of Geol., vol. viii, p. 456. 1900.
Tertiary. Wyoming. Included in Eocene.

Batesville sandstone. Simonds. Ark. Geol. Surv., 1888, vol. iv, pp. 49–53, 140. 1888.
Carboniferous. Arkansas. Included in Lower Carboniferous.

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Carboniferous. West Virginia, Maryland.

Bayard, Clark. Md. Geol. Surv., vol. i, p. 156. 1897.
Carboniferous. Maryland. Included in Coal Measures.

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Carboniferous. Maryland.

Bayard, Clark. Md. Geol. Surv., vol. ii, p. 170. 1898.
Carboniferous. Maryland.

Bayou Chicot limestone, Harris and Veatch. La. State Exp. Station, pt. v, p. 61. 1899.
Cretaceous. Louisiana. Included in Ripley stage.

Bays sandstone, Campbell. Geol. Soc. Am., Bull., vol. v, pp. 171, 176. 1894.
Silurian. Virginia. Included in Medina.

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Silurian. Kentucky, Virginia, Tennessee.

Bays sandstone, Keith. U. S. Geol. Surv., Geol. Atlas of U. S., Folios Nos. 16, 25, 27. 1895, 1896.
Silurian. Tennessee, North Carolina.

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Silurian. Tennessee. Exact Syn. Bays sandstone of Loudon folio. Part. Syns. Chickamauga limestone of Kingston folio; Trenton and Nashville group of Safford.

Bays sandstone, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 44. 1897.
Silurian. Virginia, West Virginia.

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Silurian. Virginia, Tennessee.

Beacon Hill, Salisbury. N. J. Geol. Surv., Rept. 1893, pp. 47–57, 67–72. 1894.
Pleistocene. New Jersey. Included in Yellow gravel.

Beacon Hill formation, Salisbury. N. J. State Geol., Ann. Rept. 1894, pp. 99–104. 1895.
Tertiary. New Jersey. Included in Miocene.

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Tertiary. New Jersey. Included in Miocene.

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Carboniferous. *Texas. Included in* Albany division.

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Cretaceous or Tertiary. Utah. Exact Syn. Green River.

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Cretaceous. Wyoming.

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Cretaceous. Wyoming.

Bear River group, Peale. U. S. Geol. and Geog. Surv. of Terr., 8th Ann. Rept., p. 144. 1876.
Tertiary. Colorado.

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British Columbia. Included in Upper Paleozoic. Includes Bear River limestone and Cherty series.

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Cretaceous. Utah, Wyoming. Exact Syn. Bear River Laramie.

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Bearwallow conglomerate, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 44. 1897.
Carboniferous. Virginia, West Virginia. Part. Syns. No. xii, Great conglomerate of Rogers.

Beauharnois formation, Chapman. Can. Inst., new ser., vol. viii, pp. 186–190. 1863.
Cambrian. Canada. Included in Potsdam group. "Lower Silurian."

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Silurian. Texas. Included in Leon series.

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Cambrian. Tennessee and Georgia. Included in Lower Cambrian.

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Cambrian. Tennessee, North Carolina.

Beaver River group, White. 2d Pa. Geol. Surv., Rept. Q, pp. 65–71. 1878.
Carboniferous. Pennsylvania. Includes Homewood sandstone, Mercer limestone, Connoquenessing sandstone, and Sharon shales.

Beaver River series, Chance. 2d Pa. Geol. Surv., Rept. V, p. 221 et seq. 1879.
Carboniferous. Pennsylvania.

Beaver River group, D'Invilliers. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. i, p. 1912. 1895.
Carboniferous. Pennsylvania. Included in No. xii, Pottsville conglomerate.

Beavertown marl, Foerste. Denison Univ. Sci. Lab., Bull., vol. i, p. 65. 1885.
Ohio.

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Ohio.

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Silurian. Ohio.

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Cambrian. Massachusetts. Part Syn. Stockbridge limestone.

Beckett conglomerate, Emerson. Geol. Soc. Am., Bull., vol. vii, p. 5. 1895.
Cambrian. Massachusetts.

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Cambrian. Massachusetts. Included in Lower Cambrian.

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Silurian. New York. Included in Lower Helderberg.

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Devonian. New York. Included in Helderbergian.

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Devonian. New Jersey.

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Carboniferous. Indiana.

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Carboniferous. Ohio. Included in Waverly group.

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Ohio.

Bedford shale, Read. Ohio Geol. Surv., vol. i, pt. i, pp. 485, 508, 514, 525. 1873.
Carboniferous. Ohio.

Bedford stone, Collett. Indiana Geol. Surv., 5th Ann. Rept. for 1873, pp. 276, 280, 283. 1874.
Indiana.

Bedford shale, Newberry. Ohio Geol. Surv., vol. ii, pp. 90-92, 188, 212. 1874.
Carboniferous. Ohio. Included in Waverly. Lower Carboniferous.

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Carboniferous. Ohio.

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Carboniferous. Pennsylvania and Ohio. Exact Syn. No. ix?

Bedford shale, Orton. Rev. of Strat. Geol. of East. Ohio, p. 4. 1880.
Carboniferous. Ohio.

Bedford shale, Orton. Ohio Geol. Surv., Prelim. Rept. Petroleum and Inflammable Gas, p. 25. 1886.
Ohio. Included in Waverly series.

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Carboniferous. Ohio. Included in Waverly group.

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Ohio.

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Ohio. Included in Waverly group.

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Carboniferous. Ohio. Included in Waverly group.

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Carboniferous. Ohio. Included in Waverly group.

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Carboniferous. Indiana.

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Carboniferous. Indiana.

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Carboniferous. California. Includes Calaveras formation.

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Carboniferous. California. Includes Calaveras and Mariposa formations.

Bed Rock series, Turner. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 37. 1897.
Carboniferous and older. California. Includes Calaveras and Robinson formations.

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Carboniferous and Juratrias. California. Includes Calaveras and Sailor Canyon formations.

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Juratrias and older. California. Includes Calaveras and Cedar formations.

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Carboniferous. California. Includes Calaveras.

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California. Includes Mariposa, Sailor Canyon, and Calaveras formations.

Beekmantown limestone, Clarke and Schuchert. Science, new ser., vol. x, pp. 876-877. 1899.
Silurian. New York. Included in Canadian.

Bee Spring sandstone, Moore. Ky. Geol. Surv., new ser., vol. ii, pp. 105–106. 1877.
Carboniferous. Kentucky. Included in Coal Measures.

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Silurian. Ohio. Included in Lower Silurian.

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Silurian. Ohio. Included in Middle Silurian.

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Cambrian? Newfoundland.

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Silurian. Massachusetts.

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Silurian. Massachusetts.

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Tertiary. Alabama.

Bell's Landing series, Smith and Johnson. U. S. Geol. Surv., Bull., No. 43, p. 46. 1887.
Tertiary. Alabama. Included in Lignitic; Lower Eocene.

Bell's Landing, Langdon. Geol. Soc. Am., Bull., vol. ii, p. 588. 1891.
Tertiary. Alabama. Included in Lower Eocene.

Bell's Landing, Clark. U. S. Geol. Surv., Bull., No. 141, p. 57. 1896.
Tertiary. Alabama. Included in Eocene.

Bellton coal group, White. U. S. Geol. Surv., Bull., No. 65, p. 32. 1891.
Carboniferous. West Virginia, Pennsylvania. Included in Permo-Carboniferous; Dunkard Creek series. Includes Nineveh, Dunkard, and Jollytown coals.

Bellvale Flags, Darton. Geol. Soc. Am., Bull., vol. v, pp. 367, 373. 1894.
Devonian. New Jersey.

Bellvale flags, Ries. N. Y. State Geol., 15th Ann. Rept., vol. i, p. 404. 1897.
Devonian. New York.

Belly River series, Dawson. Can. Geol. Surv., Rept. 1882-83-84, pp. 37C-126C. 1885.
Cretaceous. Canada.

Belly River series, McConnell. Can. Geol. Surv., new ser., vol. i, pp. 63C-65C. 1886.
Cretaceous. Canada.

Belly River series, Tyrrell. Can. Geol. Surv., new ser., vol. ii, 90E-129E. 1887.
Cretaceous. Canada.

Belly River formation, White. U. S. Geol. Surv., Bull., No. 82, p. 173. 1891.
Cretaceous. Rocky Mountains.

Beloit formation, Sardeson. Am. Geol., vol. xix, pp. 24, 26-29. 1897.
Silurian. Mississippi Valley. Included in Lower Silurian. Includes Fucoid, Stictopora, Stictoporella, Bellerophon, and Buff limestone beds.

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Algonkian. Montana.

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Algonkian. Montana.

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Algonkian. Montana.

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Algonkian. Montana.

Belt formation, Weed. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 56. 1899.
Algonkian. Montana.

Belt terrane, Weed. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 56. 1899.
Algonkian. Montana. Includes Neihart quartzite and Belt formation.

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Algonkian? Pre-Cambrian. Montana.

Belt terrane, Weed. U. S. Geol. Surv., 20th Ann. Rept., pt. iii, pp. 279-283. 1900.
Algonkian. Montana. Includes Neihart quartzite, Chamberlain shale, Newland limestone, Greyson shale, and Spokane shale.

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Carboniferous. Arkansas. Included in Sebastian stage.

Belvidere shales, Hill. Am. Jour. Sci., 3d ser., vol. l, pp. 208-234. 1895.
Cretaceous. Kansas, Oklahoma, New Mexico. Included in Comanche series.

Belvidere beds, Cragin. Am. Geol., vol. xvi, p. 357. 1895.
Cretaceous. Kansas. Includes Kiowa shales, Champion shell bed, Cheyenne sandstone.

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Carboniferous. Texas. Included in Lower Carboniferous.

Bend formation, Cummins. Texas Geol. Surv., 2d Ann. Rept., pp. 360-367, 372. 1891.
Carboniferous. Texas. Included in Coal Measures.

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Juratrias. California.

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Juratrias. California.

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Carboniferous. Pennsylvania. Included in Pocono.

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Cretaceous. Colorado.

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Cretaceous. Iowa.

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Cretaceous. Colorado. Included in Colorado group.

Benton group, Gilbert. U. S. Geol. Surv., 17th Ann. Rept., pt. ii, p. 564. 1896.
Cretaceous. Colorado. Includes Carlile shale, Greenhorn limestone, and Graneros shale.

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Cretaceous. Colorado. Includes Graneros shale, Greenhorn limestone, and Carlile shale.

Benton, Logan. Kan. Univ. Geol. Surv., vol. ii, pp. 215–219. 1897.
Cretaceous. Kansas. Included in Upper Cretaceous.

Benton, Adams. Kan. Univ. Geol. Surv., vol. iv, p. 27. 1898.
Cretaceous. Kansas. Included in Upper Cretaceous. Includes Upper and Lower groups.

Benton formation, Weed. U. S. Geol. Surv., 18th Ann. Rept., pt. iii, pp. 482–484. 1898.
Cretaceous. Montana. Included in Upper Cretaceous.

Benton shale, Wilder. Iowa Geol. Surv., vol. x, p. 111. 1900.
Cretaceous. Iowa.

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Carboniferous. Ohio. Included in Waverly group.

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Carboniferous. Ohio. Included in Waverly group.

Berea grit, Read. Ohio Geol. Surv., Rept. Prog. 1870, p. 468. 1871.
Ohio.

Berea grit, Newberry. Ohio Geol. Surv., vol. i, pt. i, pp. 186, 209. 1873.
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Carboniferous. Ohio.

Berea grit, Newberry. Ohio Geol. Surv., vol. ii, pp. 88, 90, 211. 1874.
Carboniferous. Ohio. Included in Waverly, Lower Carboniferous.

Berea grit, Winchell. Ohio Geol. Surv., vol. ii, pp. 240, 259, 280. 1874.
Carboniferous. Ohio.

Berea grit, Lesley. 2d Pa. Geol. Surv., Rept. I, pp. 69–72. 1875.
Carboniferous. Pennsylvania and Ohio. Exact Syn. No. X.

Berea grit, Niles. Boston Soc. Nat. Hist., Proc., vol. xviii, 1875–76, p. 273. 1876.
Ohio. Included in Waverly group.

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Carboniferous. Ohio. Included in Waverly.

Berea grit, Orton. Rev. of Strat. Geol. of East. Ohio, p. 5. 1880.
Carboniferous. Ohio.

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Carboniferous. Ohio. Included in Waverly.

Berea grit, Orton. Ohio Geol. Surv., Prelim. Rept. Petroleum and Inflammable Gas, pp. 25, 54. 1886.
Ohio. Included in Waverly series.

Bell's Landing, Clark. U. S. Geol. Surv., Bull., No. 141, p. 57. 1896.
Tertiary. Alabama. Included in Eocene.

Bellton coal group, White. U. S. Geol. Surv., Bull., No. 65, p. 32. 1891.
Carboniferous. West Virginia, Pennsylvania. Included in Permo-Carboniferous; Dunkard Creek series. Includes Nineveh, Dunkard, and Jollytown coals.

Bellvale Flags, Darton. Geol. Soc. Am., Bull., vol. v, pp. 367, 373. 1894.
Devonian. New Jersey.

Bellvale flags, Ries. N. Y. State Geol., 15th Ann. Rept., vol. i, p. 404. 1897.
Devonian. New York.

Belly River series, Dawson. Can. Geol. Surv., Rept. 1882–83–84, pp. 37C–126C. 1885.
Cretaceous. Canada.

Belly River series, McConnell. Can. Geol. Surv., new ser., vol. i, pp. 63C–65C. 1886.
Cretaceous. Canada.

Belly River series, Tyrrell. Can. Geol. Surv., new ser., vol. ii, 90E–129E. 1887.
Cretaceous. Canada.

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Cretaceous. Rocky Mountains.

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Silurian. Mississippi Valley. Included in Lower Silurian. Includes Fucoid, Stictopora, Stictoporella, Bellerophon, and Buff limestone beds.

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Algonkian. Montana.

Belt beds, Iddings and Weed. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 1. 1894.
Algonkian. Montana.

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Algonkian. Montana.

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Algonkian. Montana.

Belt formation, Weed. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 56. 1899.
Algonkian. Montana.

Belt terrane, Weed. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 56. 1899.
Algonkian. Montana. Includes Neihart quartzite and Belt formation.

Belt terrane, Walcott. Geol. Soc. Am., Bull., vol. x, pp. 199, 201. 1899.
Algonkian? Pre-Cambrian. Montana.

Belt terrane, Weed. U. S. Geol. Surv., 20th Ann. Rept., pt. iii, pp. 279–283. 1900.
Algonkian. Montana. Includes Neihart quartzite, Chamberlain shale, Newland limestone, Greyson shale, and Spokane shale.

Belva shale, Stevenson. N. Y. Acad. Sci., Trans., vol. xv, p. 51. 1896.
Carboniferous. Arkansas. Included in Sebastian stage.

Belvidere shales, Hill. Am. Jour. Sci., 3d ser., vol. l, pp. 208–234. 1895.
Cretaceous. Kansas, Oklahoma, New Mexico. Included in Comanche series.

Belvidere beds, Cragin. Am. Geol., vol. xvi, p. 357. 1895.
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Carboniferous. Indiana.

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Cretaceous. Western United States.

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Tertiary. California.

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Paleozoic. New York. Included in Champlain division. Includes Mohawk limestone, Birdseye limestone, Bald Mountain limestone, Blue limestone, Chazy limestone, Neeleytown limestone, Metalliferous, Transition and Sparry lime rocks, and No. II, Pennsylvania survey.

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Silurian. Missouri.

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Pleistocene. Missouri.

Bluff, Broadhead. Mo. Geol. Surv. Rept. 1855–1871, pp. 40, 67, 94. 1873.
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Cretaceous. Texas.

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Carboniferous. Indian Territory. Included in Lower Carboniferous. Includes Kessler limestone, Pentremital limestone, Washington shale and sandstone, Archimedes limestone, Marshall shale. Exact Syns. St. Louis and Chester.

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British Columbia. Exact Syn. Anderson River group.

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British Columbia.

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Wyoming.

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Tertiary. Gulf States.

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Tertiary. Utah.

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Tertiary. Utah. Exact Syn. Green River.

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Carboniferous. Kansas. Exact Syn. Garnett limestone.

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Carboniferous. Texas. Included in Strawn division.

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Silurian. West Virginia, Maryland.

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Carboniferous. British Columbia. Exact Syn. Marble Canon limestone.

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Carboniferous? British Columbia.

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Carboniferous. California. Included in Bed Rock series.

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Carboniferous. California. Included in Bed Rock series.

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Calciferous group, Vanuxem. Geol. of New York, pt. iii, pp. 30–38. 1842.

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Calciferous sandstone, Foster and Whitney. Rept. on Geol. of Lake Superior Dist., pt. ii, p. 134, spec. sess. Mar., 1851, Ex. Doc. no. iv. 1851.

Silurian. Lake Superior region.

Calciferous sandstone, Shumard. Mo. Geol. Surv., 1st and 2d Ann. Repts., pt. ii, p. 160. 1855.

Silurian. Missouri. Included in Lower Silurian. Includes Saccharoidal sandstone, 2d Magnesian limestone. Exact Syns. St. Peter sandstone, Lower Magnesian limestone of Iowa, Wisconsin, and Minnesota.

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Calciferous formation, Logan. Can. Geol. Surv., Rept. 1843–1863, pp. 110–122. 1863.

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Calciferous group, Chapman. Can. Inst., new ser., vol. viii, pp. 190–195. 1863.

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Calciferous epoch, Irving. Wis. Acad. Sci., Trans., vol. i–ii, 1870–1872, pp. 129–137. 1872.

Wisconsin.

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Silurian. Virginia.

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Carboniferous. Texas. Includes Campophyllum bed, Bluff Creek, Home Creek, Hog Creek, Chert, No. 7, Clear Creek, Cedarton, Adams Branch limestone, Brownwood, Rochelle conglomerate, and Coral limestone beds.

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Cretaceous. Texas.

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Cretaceous. Texas.

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Cretaceous. Texas. Included in Fredericksburg division of Lower Cretaceous.

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Cretaceous. Texas. Included in Upper Cretaceous. (Lower Cretaceous).

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Cretaceous. Colorado. Included in Benton group.

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Cretaceous. Colorado.

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Carboniferous. Kansas.

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Carboniferous. Kansas.

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Carboniferous. Kansas.

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Tertiary. British Columbia. Included in Miocene.

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Tertiary. California. Included in Eocene? Part. syn. Tejon?

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Tertiary. North and South Carolina.

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Tertiary. Trinidad. Included in Newer Parian group.

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Trinidad.

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Tertiary. California. Included in Miocene.

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Carboniferous. Arkansas.

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British Columbia.

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Carboniferous? British Columbia.

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Devonian. Pennsylvania. Included in Chemung.

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Archean, Michigan.

Cascade formation, Weed. U. S. Geol. Surv., Geol. Atlas of U. S., Folios Nos. 55, 56. 1899.
Cretaceous. Montana.

Caseyville sandstone, Owen. Ky. Geol. Surv., vol. iii, p. 21. 1857.
Carboniferous. Kentucky. Included in Coal Measures.

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Devonian. New York.

Cashaqua shale, Hall. N. Y. Geol. Surv., 5th Ann. Rept., p. 165. 1841.
New York.

Cashaqua shale, Hall. Geol. of New York, pt. iv, 4th Geol. Dist., pp. 18, 226-227. 1843.
Paleozoic. New York. Included in Portage group.

Cason limestone and shale, Williams. Am. Jour. Sci., 3d ser., vol. xlvii, pp. 326-329. 1894.
Silurian. Arkansas. Included in Upper Silurian.

Cassville plant shale, White. U. S. Geol. Surv., Bull. No. 65, p. 41. 1891.
Carboniferous. West Virginia. Included in Permo-Carboniferous, Dunkard Creek series.

Castle limestone, Weed. U. S. Geol. Surv., 20th Ann. Rept., pt. iii, p. 293. 1900.
Carboniferous. Montana. Included in Madison group.

Castle Mountain group, McConnell. Can. Geol. Surv., Rept., new ser., vol. ii, pp. 15D, 24D-29D. 1887.
Cambro-Silurian. Canada.

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Cambrian? British Columbia.

Castle Mountain group, McConnell. Can. Geol. Surv., new ser., vol. vii, p. 34C. 1896.
Canada. Included in Lower Paleozoic.

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Cambro-Silurian. Canada.

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Algonkian. Virginia, Maryland, West Virginia.

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Virginia, Maryland.

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Devonian. New York. Includes Nos. 8, 9, 10, and 11 of Pennsylvania survey.

Catskill Mountain series, Mather. N. Y. Geol. Surv., 5th Ann. Rept., pp. 75-85. 1841.
Devonian. New York. Includes Montrose sandstone, Chemung group, Ithaca group, Sherburne flags, Hamilton group, Marcellus shales.

Catskill group, Vanuxem. Geol. of New York, pt. iii, pp. 186-194. 1842.
Paleozoic. New York. Included in New York system. Includes Montrose and *Oneonta sandstones,* No. 9 Pennsylvania survey.

Catskill shaly limestone, Vanuxem. Geol. of New York, pt. iii, pp. 120–122. 1842.
Paleozoic. New York. Included in New York system. Includes Delthyris shaly limestone, Scutella limestone. Part. syn. No. 6, Pennsylvania survey.

Catskill division, Mather. Geol. of New York, pt. i, pp. 299–316. 1843.
Paleozoic. New York. Included in New York system. Includes Montrose and Oneonta sandstones, Old Red Sandstone Nos. ix, x, xi, xii, Pennsylvania survey.

Catskill group, Emmons. Agriculture of New York, vol. i, pp. 193–197. 1846.
Devonian. New York. Included in Catskill division of New York system.

Catskill division, Emmons. Agriculture of New York, vol. i, pp. 187–197. 1846.
Devonian. New York. Included in New York system. Includes Chemung, Portage, Ithaca and Catskill groups.

Catskill shaly limestone, Owen. Am. Jour. Sci., 2d ser., vol. i, p. 50. 1846.
Silurian. New York. Included in No. 6 Pennsylvania Survey, Helderberg series (or division) of the New York system. Includes Delthyris shaly limestone and Scutella limestone.

Catskill group, Dawson. Am. Jour. Sci., 2d ser., vol. xxxv, pp. 314–319. 1863.
Devonian. Canada. Exact Syn. Old Red Sandstone.

Catskill, Newberry. Ohio Geol. Surv., vol. i, pt. i, p. 71. 1873.
Devonian. Ohio.

Catskill formation, Fontaine. Am. Jour. Sci., 3d ser., vol. vii, p. 578. 1874.
Devonian. West Virginia.

Catskill, Hotchkiss. A Geographical and Political Summary of Virginia, p. 22. 1876.
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Devonian. Appalachian region. Exact Syn. Ponent.

Catskill, Ashburner. 2d Pa. Geol. Surv., Rept. F, pp. 217–220. 1878.
Devonian. Pennsylvania. Exact syns. Ponent, Old Red Sandstone.

Catskill, Newberry. Ohio Geol. Surv., vol. iii, p. 21. 1878.
Carboniferous. Ohio, Pennsylvania.

Catskill group, Stevenson. Am. Jour. Sci., 3d ser., vol. xv, pp. 423–430. 1878.
Devonian. Pennsylvania.

Catskill, Chance. 2d Geol. Surv. of Pa., Rept. G^4, pp. 101–103. 1880.
Devonian. Pennsylvania. Exact syn. No. ix, Ponent.

Catskill, White. 2d Geol. Surv. of Pa., Rept. G^5, pp. 9–73. 1881.
Devonian. Pennsylvania. Includes Mount Pleasant and Elk Mountain shales, Cherry Ridge group, Honesdale sandstone, Montrose shale, Paupack sandstone, New Milford group, Starucca shale. Exact syn. No. ix.

Catskill, Platt. 2d Pa. Geol. Surv., Rept. T, pp. 26–27. 1881.
Devonian. Pennsylvania. Exact syn. No. ix.

Catskill, White. 2d Pa. Geol. Surv., Rept. G^6, pp. 91–104. 1882.
Devonian. Pennsylvania. Includes Mount Pleasant shale, Elk Mountain sandstone, Cherry Ridge group, Honesdale sandstone, Montrose shale, Delaware River flags, New Milford shale, Starucca sandstone.

Catskill, Stevenson. 2d Pa. Geol. Surv., Rept. T^2, pp. 73–75. 1882.
Devonian. Pennsylvania.

Catskill, White. 2d Pa. Geol. Surv., Rept. G^7, pp. 54–63. 1883.
Devonian. Pennsylvania. Exact syn. No. ix.

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Devonian. Pennsylvania. Included in Nos. viii–ix.

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Devonian. Pennsylvania.

Catskill, Claypole. 2d Pa. Geol. Surv., Rept. F^2, pp. 72–78. 1885.
Devonian. Pennsylvania. Includes Kings Mill sandstone and shale, Dellville sandstone.

Catskill, Ashburner. 2d Pa. Geol. Surv., Rept. R^2, pp. 376–377. 1885.
Devonian. Pennsylvania. Exact syn. No. ix.

Catskill, White. 2d Pa. Geol. Surv., Rept. T^3, pp. 88–99. 1885.
Devonian. Pennsylvania.

Catskill sandstone, Winslow. 2d Pa. Geol. Surv., Rept. 1886, pt. iv, pp. 1338, 1344, 1354, 1357, 1358, 1359, 1361, 1363. 1887.
Carboniferous. Pennsylvania. Exact syn. No. ix.

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Catskill limestone, Hopkins. Ark. Geol. Surv., 1890, vol. iv, p. 52. 1890.
Silurian. Arkansas. Included in Lower Helderberg.

Catskill, D'Invilliers. 2d Pa. Geol. Surv., Rept. F^3, pp. 44–45. 1891.
Devonian. Pennsylvania. Exact syn. No. ix.

Catskill, Williams. U. S. Geol. Surv., Bull., No. 80, p. 121. 1891.
Devonian.

Catskill, Stevenson. Am. Assoc. Adv. Sci., Proc., vol. xl, p. 219. 1891.
Devonian. Appalachian region.

Catskill, Prosser. Am. Geol., vol. vii, p. 351. 1891.
Devonian. New York, Pennsylvania.

Catskill, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, pp. 1567–1627. 1892.
Devonian. Pennsylvania. Exact Syn. No. ix.

Catskill, Stevenson. Am. Geol., vol. ix, p. 6. 1892.
Devonian. Appalachian region. Included in Upper Devonian, Chemung.

Catskill, Darton. Am. Jour. Sci., 3d ser., vol. xlv, pp. 208–209. 1893.
Devonian. New York. Includes Portage and Chemung.

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Devonian. New York.

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California. Includes Hosselkus limestone.

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Carboniferous. Texas. Included in Canyon division.

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Devonian. Iowa.

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Cretaceous. Rocky Mountains. Included in Upper Cretaceous.

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Cretaceous or Tertiary. Colorado, Wyoming.

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Tertiary. Nebraska. Included in Oligocene?

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Carboniferous. Missouri. Included in Coal Measures.

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Carboniferous. Texas. Included in Cisco division.

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Cretaceous. Arkansas. Included in Upper Cretaceous or Exogyra costata series. Includes Marlbrook-Columbus or Gryphæa vesicularis chalk marls, Brownstone marls, White Cliff chalk, Rocky Comfort chalk.

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Cretaceous. Kansas. Included in Belvidere beds.

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Lower Cretaçeous. Kansas. Included in Comanche series, Fredericksburg division. Exact Syn. Comanche Peak limestone.

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Paleozoic. New York. Included in New York Transition system. Includes Potsdam sandstone, Calciferous sand rock, Chazy limestone, Birdseye limestone, Trenton limestone, Utica slate, Lorraine shales, Grey sandstone.

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Paleozoic, New York. Included in New York system. Includes Hudson River group, Utica slate, Trenton, Black River limestone, Calciferous group, Potsdam sandstone.

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New York. Includes Potsdam and Calciferous sandstone, Chazy and Birdseye limestones, Isle Lamotte marble, Trenton limestone, Utica slate, Lorraine shales, and Oneida conglomerate.

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Vermont.

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Silurian. New York. Exact Syn. Ordovician.

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Carboniferous. Kansas.

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Eocene. Jamaica. Included in Blue Mountain series, Cambridge formation.

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Permian. Kansas, Oklahoma. Included in Dog Creek formation of Cimarron series.

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Devonian. Maine.

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Maine.

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Carboniferous. West Virginia. Exact Syn. No. xiv. Lower Barren Measures.

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Carboniferous. West Virginia, Ohio. Included in Elk River series.

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Permian. Kansas. Included in Big Blue series.

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Carboniferous. Kansas.

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Tertiary. Georgia. Included in Miocene.

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Tertiary. Georgia.

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Miocene. Georgia, Florida. Included in Chipola epoch. Includes Hawthorne and Ocheesee beds.

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Devonian. Tennessee. Exact syn. black shale.

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Devonian. Alabama.

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Devonian. Tennessee.

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Devonian. Alabama. Part. syn. Black shale.

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Devonian. Kentucky.

Chattanooga shale, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 53. 1899.
Devonian. Tennessee.

Chattanooga shale, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 59. 1899.
Devonian. Virginia, Tennessee.

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Devonian. New York. Includes Chemung beds.

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Paleozoic. New York. Included in New York Transition system, Champlain group.

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Silurian. New York. Included in Champlain division of New York system.

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New York. Included in New York system, Champlain division.

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Silurian. Michigan.

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Paleozoic. Vermont. Included in Trenton period. Exact syn. Isle La Motte limestone.

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Lower Silurian. Canada.

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Silurian. Canada.

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Silurian. Pennsylvania.

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Silurian. Canada.

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Silurian. Arkansas.

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Silurian. Kentucky.

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Silurian. New York.

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Ordovician. New York.

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Silurian. Vermont and New York.

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Silurian. New York.

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Silurian. New York.

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Silurian. New York. Included in Canadian.

Chehalis, Lawson. Am. Geol., vol. xiii, p. 437. 1894.
Tertiary. Washington. Included in Eocene or Miocene.

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Devonian. New York.

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Devonian. New York.

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Paleozoic. New York. Included in New York system. Includes Ithaca group, No. 9 Pennsylvania survey.

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Devonian. New York. Included in Catskill division of New York system.

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Carboniferous. Missouri. Includes Chouteau limestone.

Chemung, Swallow. Mo. Geol. Surv., 1st and 2nd Ann. Repts., pp. 101, 176. 1855.
Devonian. Missouri. Includes Chouteau, Vermicular, and Lithographic.

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Devonian. Iowa.

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Devonian. Iowa.

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Iowa.

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Devonian. Ohio.

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Devonian. New York.

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Devonian. Pennsylvania, New York. Exact syn. No. viii.

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Devonian. Virginia. Included in Devonian or Old Red Sandstone. Exact syn. Vergent (Formation ix, Rogers).

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Devonian. Appalachian region. Exact syn. Vergent.

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Devonian. Pennsylvania. Part. syns. Ponent series and Vergent series.

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Carboniferous. Ohio, Pennsylvania.

Chemung group, Miller. Cin. Soc. Nat. Hist., Jour., vol. iv, no. iv, p. 289. 1881.
Silurian.

Chemung, White. 2d Pa. Geol. Surv., Rept. G^5, pp. 73–79. 1881.
Devonian. Pennsylvania. Includes Cascade sandstone. Part. syn. No. viii.

Chemung, Platt. 2d Pa. Geol. Surv., Rept. T, pp. 27–29. 1881.
Devonian. Pennsylvania.

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Devonian. Pennsylvania.

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Devonian. Pennsylvania. Included in No. viii.

Chemung group, Williams. Am. Jour. Sci., 3d ser., vol. xxv, pp. 97–104. 1883.
Devonian. Mississippi Valley, New York.

Chemung, White. 2d Pa. Geol. Surv., Rept. G^7, pp. 67–83. 1883.
Devonian. Pennsylvania. Includes Portage. Exact syn. No. viii.

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Devonian. Appalachian region. Includes Portage, Chemung, Catskill.

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Devonian.

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Devonian. New York.

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Devonian. Pennsylvania.

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Silurian. Massachusetts.

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Silurian. Tennessee. Exact Syn. Trenton?

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Silurian. Georgia, Alabama.

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Chickamauga limestone, Keith. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 33. 1896.
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Tertiary. California.

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Cretaceous. Mexico.

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Cretaceous. California.

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Cretaceous. Tertiary. California.

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Cretaceous.

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Trias. Massachusetts.

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Juratrias. Massachusetts. Included in Connecticut River sandstone.

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Tennessee. Includes in Cambrian system (?).

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Silurian. Tennessee. Included in Potsdam group.

Chilhowee sandstones, Kerr. N. C. Geol. Surv., Rept. 1866–67, p. 29. 1869. North Carolina.

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Silurian. Tennessee. Included in Potsdam group.

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Cambrian. Tennessee. Exact syn. Potsdam sandstone.

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Silurian. Georgia. Included in Lower Primordial.

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Cambrian. Georgia. Included in Lower Cambrian.

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Tennessee. Included in Cambrian.

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Cambrian. Tennessee. Includes Sandsuck shale, Starr conglomerate, Cochran conglomerate, Nichols shale, Nebo sandstone, Murray shale.

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Tertiary. Florida. Included in Miocene.

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Algonkian. Wisconsin. Included in Upper Huronian. Part. syns. Penokee, Upper Marquette, Animikie.

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Alaska.

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Connecticut.

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Cretaceous. Texas. Included in Main street limestone.

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Devonian. Missouri. Included in Chemung.

Chouteau limestone, Shumard. St. Louis Acad. Sci., Trans., vol. i, p. 408. 1857.
Missouri. Included in Chemung group.

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Carboniferous? Illinois.

Chouteau limestone, Shumard. Mo. Geol. Surv. Repts., 1855–1871, pp. 45, 295. 1873.
Carboniferous. Missouri. Included in Chemung group. Lower Carboniferous.

Chouteau limestone, Meek. Mo. Geol. Surv. Repts., 1855–1871, p. 174. 1873.
Carboniferous. Missouri. Included in Lower Carboniferous.

Chouteau group, Broadhead. Mo. Geol. Surv. Rept., 1873–74, pp. 26–65. 1874.
Carboniferous. Missouri. Included in Lower Carboniferous, Mountain limestone. Includes Chouteau limestone, Vernicular sandstone, Lithographic limestone. Exact syns. Chemung group, Kinderhook group.

Chouteau group, Broadhead. St. Louis Acad. Sci., Trans., vol. iii, pp. 219, 220. 1878.
Carboniferous. Missouri. Includes Chouteau limestone, Vernicular sandstone, and the Lithographic limestone. Exact syn. Kinderhook group.

Chouteau, Rowley. Am. Geol., vol. iii, pp. 111–116. 1889.
Carboniferous. Missouri.

Chouteau, Ladd. Mo. Geol. Surv., Bull. No. 3, pp. 14, 15. 1890.
Lower Carboniferous. Missouri. Exact syn. Waverly.

Chouteau group, Williams. U. S. Geol. Surv., Bull., No. 80, p. 170. 1891.
Carboniferous. Included in Mississippian series. Includes Chouteau limestone, Vermicular sandstone, and Lithographic limestone.

Chouteau, Miller. Mo. Geol. Surv., Bull. No. 4, p. 6. 1891.
Lower Carboniferous. Missouri. Exact syn. Waverly, Marshall, Kinderhook.

Chouteau limestone, Keyes. Geol. Soc. Am., Bull., vol. iii, p. 283. 1892.
Lower Carboniferous. Missouri. Included in Kinderhook beds.

Chouteau limestone, Keyes. Iowa Geol. Surv., vol. i, p. 56. 1893.
Carboniferous. Iowa. Included in Kinderhook.

Chouteau group, Broadhead. Am. Geol., vol. xii, p. 82. 1893.
Carboniferous. Missouri. Included in Mississippian series. Includes Chouteau limestone, Vernicular sandstone, Lithographic limestone.

Chouteau limestone, Keyes. Mo. Geol. Surv., vol. iv, pp. 30, 50, 57, 76. 1894.
Lower Carboniferous. Missouri. Included in Kinderhook stage.

Chouteau limestone, Keyes. Mo. Geol. Surv., vol. vii, pt. ii, pp. 390, 395. 1894.
Lower Carboniferous. Missouri. Included in Kinderhook stage.

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Carboniferous. Mississippi Valley.

Chouteau limestone, Stewart. Kan. Univ. Quart., vol. iv, pp. 161-162. 1896.
Carboniferous. Missouri.

Chouteau limestone, Keyes. St. Louis Acad. Sci., Trans., vol. vii, p. 359. 1897.
Carboniferous. Missouri.

Chouteau limestone, Shepard. Mo. Geol. Surv., Rept., vol. xii, pp. 49, 92-100. 1898.
Lower Carboniferous. Missouri. Included in Kinderhook stage.

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Carboniferous. Mississippi Valley.

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Algonkian. Arizona.

Chuar, Walcott. U. S. Geol. Surv., 14th Ann. Rept., pt. ii, p. 506. 1894.
Algonkian. Grand Canyon of Colorado. Included in Grand Canyon series.

Chuar terrane, Walcott. Jour. of Geol., vol. iii, pp. 319-322. 1895.
Algonkian. Grand Canyon region. Included in Grand Canyon series.

Chuar terrane, Walcott. Geol. Soc. Am., Bull., vol. x, p. 215. 1899.
Algonkian. Arizona. Included in Grand Canyon series.

Chuar, Crosby. Geol. Soc. Am., Bull., vol. x, p. 158. 1899.
Algonkian. Colorado. Included in Grand Canyon group.

Churchill Arkose sandstone, Tyrrell. Can. Geol. Surv., new ser., vol. ix, p. 174F. 1898.
Cambrian. Hudson Bay region.

Cimarron series, Cragin. Colo. College Stud., vol. vi, pp. 3, 18-48. 1896.
Permian. Kansas. Includes Kiger division above and Salt Fork below, 10 formations.

Cimarron series, Prosser. Kan. Univ. Quart., vol. vi, pp. 150-151, 175. 1896.
Permian or Triassic? Kansas.

Cimarron series, Prosser. Kan. Univ. Geol. Surv., vol. ii, pp. 75-95. 1897.
Carboniferous. Kansas. Included in Permian? Includes Kiger and Salt Fork divisions, comprising Big Basin sandstone, Hackberry shales, Day Creek dolomite, Red Bluff sandstones, Dog Creek shales, Cave Creek gypsum, Flower-pot shales, Cedar Hill sandstones, Salt Plain measures and Harper sandstones. Upper Permian.

Cimarron series, Grimsley. Geol. Soc. Am., Bull., vol. viii, p. 228. 1897.
Permian. Kansas.

Cimarron series, Cragin. Am. Geol., vol. xix, pp. 351-363. 1897.
Permian. Indian Territory, Kansas, Oklahoma. Includes Kiger and Salt Fork divisions.

Cincinnati limestone, Mather. Rept. State House Artesian Well at Columbus, Ohio. p. 6. 1859.
Ohio.

Cincinnati group, Meek and Worthen. Phil. Acad. Nat. Sci., Proc., vol. xvii, p. 155. 1865.

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Silurian. Illinois. Included in Lower Silurian. Includes Cape Girardeau limestone, and Thebes sandstone in southern Illinois.

Cincinnati group, Whitney. Ill. Geol. Surv., vol. i, pp. 172–177. 1866.
Silurian. Illinois.

Cincinnati group, Worthen. Ill. Geol. Surv., vol. iii, pp. 26–27, 117. 1868.
Silurian. Illinois.

Cincinnati limestone, Haymond. Indiana Geol. Surv., 1st Ann. Rept., 1869, p. 192. 1869.
Indiana.

Cincinnati group, Bannister. Ill. Geol. Surv., vol. iv, pp. 121, 140. 1870.
Silurian. Illinois.

Cincinnati group, Bradley. Ill. Geol. Surv., vol. iv, pp. 200, 216, 233. 1870.
Silurian. Illinois.

Cincinnati group, Worthen. Ill. Geol. Surv., vol. iv, p. 5. 1870.
Silurian. Illinois.

Cincinnati group, Newberry. Ohio. Geol. Surv., Rept. Prog., 1869, p. 19. 1870.
Silurian. Ohio. Exact syn. Blue Limestone group.

Cincinnati group, Newberry. Ohio Geol. Surv., Rept. Prog., 1869, pp. 12, 14. 1870.
Silurian. Ohio. Exact syn. Blue limestone.

Cincinnati group, Newberry. Ohio Geol. Surv., Rept. Prog., p. 14. 1871.
Silurian. Ohio.

Cincinnati group, Shaw. Ill. Geol. Surv., vol. v, pp. 35–56, 65–66, 77–78, 98–99, 110–111, 131–132, 152–154. 1873.
Silurian. Illinois.

Cincinnati group, Orton. Ohio. Geol. Surv., vol. i, pt. i, pp. 367, 437. 1873.
Silurian. Ohio. Includes Lebanon, Cincinnati, and Point Pleasant beds. Exact syns. Blue limestone, Hudson River.

Cincinnati, Newberry. Ohio Geol. Surv., vol. i, pt. i, pp. 103, 116. 1873.
Silurian. Ohio. Includes Lebanon, Cincinnati, and Point Pleasant beds.

Cincinnati group, Miller. Cin. Quart. Jour. Sci., vol. i, pp. 97–115. 1874.
Silurian. Ohio Valley. Included in Ordovician.

Cincinnati group, Borden. Indiana Geol. Surv., 5th Ann. Rept. 1873, p. 137. 1874.
Indiana.

Cincinnati group, Broadhead. Mo. Geol. Surv., Rept., 1873–74, p. 28. 1874.
Silurian. Missouri. Included in Lower Silurian. Exact syns. Hudson River and Utica shales.

Cincinnati, Orton. Ohio. Geol. Surv., vol. ii, p. 662. 1874.
Silurian. Ohio.

Cincinnati group, Bradley. Am. Jour Sci., 3d ser., vol. ix, p. 281. 1875.
Silurian. Tennessee.

Cincinnati group, Shaler. Ky. Geol. Surv., new ser., vol. iii, pp. 149–159. 1877.
Silurian. Kentucky.

Cincinnati shales and limestone, Chamberlin. Geol. of Wisconsin, vol. ii, p. 314. 1877.
Lower Silurian. Wisconsin.

Cincinnati group, Newberry. Ohio Geol. Surv., vol. iii, p. 2. 1878.
Silurian. Ohio. Included in Lower Silurian.

Cincinnati group, Orton. Ohio Geol. Surv., vol. iii, pp. 382, 400, 406. 1878.
Silurian. Ohio. Exact syn. Blue limestone.

Cincinnati. Kansas City Rev., vol. ii, No. xi, p. 668. 1879.
Silurian. Ohio.

Cincinnati group, Miller. Cin. Soc. Nat. Hist., Jour., vol. iv, p. 269. 1881.
Ordovician.

Cincinnati group, Foerste. Denison Univ. Sci. Lab., Bull., vol. i, p. 64, etc. 1885.
Ohio.

Cincinnati group, James. Cin. Soc. Nat. Hist., Jour., vol. ix, No. 2, p. 20. 1886.
Ordovician.

Cincinnati series, Orton. Ohio Geol. Surv., Prelim. Rept. Petroleum and Inflammable Gas, p. 19. 1886.
Ohio.

Cincinnati group, James. Cin. Soc. Nat. Hist., Jour., vol. x, No. 2, pp. 71, 77. 1887.
Ordovician. Ohio.

Cincinnati group, Foerste. Denison Univ. Sci. Lab., Bull., vol. iii, p. 3. 1888.
Ohio.

Cincinnati limestone, Hopkins. Ark. Geol. Surv., 1890, vol. iv, p. 51. 1890.
Silurian. Arkansas.

Cincinnati, James. Am. Geol., vol. v, p. 335. 1890.
Silurian. Ohio and Mississippi Valley. Part. syn. Maquoketa.

Cincinnati group, James. Cin. Soc. Nat. Hist., Jour., vol. xiv, No. 2, p. 93. 1891.
Ordovician. Ohio.

Cincinnati group, James. Cin. Soc. Nat. Hist., Jour., vol. xiv, No. i, p. 45. 1891.
Lower Silurian.

Cincinnati limestone and shale, Hall and Sardeson. Geol. Soc. Am., Bull., vol. iii, pp. 332, 365. 1892.
Silurian. Minnesota. Includes Maquoketa beds and Wykoff beds.

Cincinnati group, Hubbard. Indiana Acad. Sci., Proc., 1885–1891, p. 68. 1892.
Lower Silurian. Indiana.

Cincinnati group, Hershey. Science, vol. xxii, p. 202. 1893.
Silurian. Illinois.

Cincinnati formation, Foerste. Cin. Soc. Nat. Hist., Jour., vol. xviii, nos. 3, 4, p. 163. 1896.
Ordovician. Ohio.

Cincinnati, Winchell and Ulrich. Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iii, pt. ii, p. ci. 1897.
Lower Silurian. Minnesota. Exact syn. Hudson River.

Cincinnati group, Kindle. Indiana Dept. Geol. and Nat. Res., 22d Ann. Rept., 1897, p. 408. 1898.
Ordovician. Indiana.

Cincinnati beds, Newsom. Indiana Acad. Sci., Proc. 1897, p. 250. 1898.
Indiana.

Cincinnati rocks, Ashley. Indiana Dept. Geol. and Nat. Res., 23d Ann. Rept., 1898, p. 77. 1899.
Lower Silurian. Indiana.

Cincinnatian, Clarke and Schuchert. Science, new ser., vol. x, pp. 876–877. 1899.
Silurian. New York. Includes Utica shale, Lorraine beds, Richmond beds.

Cisco division, Cummins. Texas Geol. Surv., 2d Ann. Rept., pp. 374–375. 1891.
Carboniferous. Texas. Included in Coal Measures.

Cisco division, Drake. Texas Geol. Surv., 4th Ann. Rept., pp. 402–421. 1893.
Carboniferous. Texas. Includes Santa Anna branch, No. 18, Horse Creek, Watts Creek, Camp Colorado, No. 13, Stockwether bed, Coon Mountain, Camp Creek, Saddle Creek, Waldrip, Chaffin, Parks Mountain, Lohn, Speck Mountain, Bellerophon, and Trickham beds.

Citadel series, Ells. Geol. Soc. Am., Bull., vol. i, p. 465. 1889.
Ordovician. Quebec. Included in Quebec group.

Citadel rocks, Bailey and McInnes. Can. Geol. Surv., new ser., vol. v, pt. i, pp. 5M–6M, 13M–14M. 1893.
Silurian. Canada. Included in Cambro-Silurian. Part. syn. Trenton-Utica.

Citico conglomerate, Walcott. Geol. Soc. Am., Bull., vol. v, p. 196. 1894.
Archean? Tennessee. Included in Ocoee.

Citico conglomerate, Hayes. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 20. 1895.
Algonkian? Tennessee. Included in Ocoee series.

Citico conglomerate, Keith. U. S. Geol. Surv., Geol. Atlas of U. S., Folios Nos. 16, 25. 1895, 1896.
Tennessee, North Carolina. Included in Ocoee group.

Claiborne deposits, Conrad. Phil. Acad. Nat. Sci., vol. vii, pp. 116–123. 1834.
Included in Eocene.

Claiborne sandstone, Conrad. Phil. Acad. Nat. Sci., Proc., vol. iii, pp. 280–281. 1846.
Mississippi. Included in Lower Eocene.

Claiborne, Conrad. Phil. Acad. Nat. Sci., Proc., vol. vii, p. 257. 1856.
Mississippi. Included in Eocene.

Claiborne group, Hilgard. Rept. on Geol. and Agric. Miss., pp. 123–128. 1860.
Eocene. Mississippi. Includes Siliceous Claiborne, Lignitic clays and sands of Northern Clarke County? Part. syns. Buhrstone, Claiborne, etc.

Claiborne group, Hilgard. Am. Jour. Sci., 2d ser., vol. xliii, p. 33. 1867.
Tertiary. Alabama, Mississippi. Exact syn. Claiborne group proper, or Calcareous Claiborne.

Claiborne, Mell. Am. Inst. Mg. Engrs., Trans., vol. viii, p. 304. 1880.
Tertiary. Alabama.

Claibornian, Heilprin. Phil. Acad. Nat. Sci., Proc., 1882, p. 184. 1882.
Included in Eocene. Exact syn. Claiborne.

Claibornian, Heilprin. Phil. Acad. Nat. Sci., Jour., vol. ix, pp. 116, 120, 145–147. 1884.
Included in Tertiary, Eocene.

Claiborne, Aldrich. Am. Jour. Sci., 3d ser., vol. xxx, pp. 300–303. 1885.
Tertiary. Alabama.

Claiborne, Meyer. Am. Jour. Sci., 3d ser., vol. xxx, pp. 421–435. 1885.
Tertiary. Gulf region.

Claiborne, Smith. Am. Jour. Sci., 3d ser., vol. xxx, p. 272. 1885.
Tertiary. Gulf States.

Claiborne, Langdon. Am. Jour. Sci., 3d ser., vol. xxxi, p. 206. 1886.
Tertiary. Mississippi.

Claiborne group, Aldrich. Cin. Soc. Nat. Hist., Jour., vol. viii, p. 256. 1886.
Tertiary.

Claiborne, Aldrich. Ala. Geol. Surv., Bull., No. 1, p. 44. 1886.
Tertiary. Alabama.

Claiborne, Smith. Ala. Geol. Surv., Bull. No. 1, p. 8. 1886.
Tertiary. Alabama.

Claiborne, Smith and Johnson. U. S. Geol. Surv., Bull. No. 43, pp. 16, 18. 1887.
Tertiary. Alabama. Included in Middle Eocene.

Claiborne series, Langdon. Ga. Geol. Surv., 1st Rept. Prog., p. 96. 1891.
Tertiary. Georgia.

Claiborne division, Spencer. Ga. Geol. Surv., 1st Rept. Prog., p. 51. 1891.
Tertiary. Georgia. Included in Eocene.

Claiborne, Langdon. Geol. Soc. Am., Bull., vol. ii, p. 588. 1891.
Tertiary. Alabama. Included in Middle Eocene.

Claiborne division, Spencer. Ga. Geol. Surv., 1st Rept. Prog., 1890–91. 1891.
Tertiary. Georgia. Included in Middle Eocene.

Claiborne, Clark. U. S. Geol. Surv., Bull. No. 83, pp. 58, 62, 68. 1891.
Tertiary. Alabama, Mississippi. Included in Eocene.

Claiborne stage, Harris. Ark. Geol. Surv., 1892, vol. ii, p. 87. 1892.
Tertiary. Arkansas. Included in Eocene series.

Claiborne, Smith. Ala. Geol. Surv., Bull., No. 2, pp. 53, 62. 1892.
Tertiary. Alabama.

Claiborne, Smith, Johnson, and Langdon. Ala. Geol. Surv., Geol. of Coastal Plain of Alabama, pp. 122, 232, 385, 492, 494. 1894.
Tertiary. Alabama. Included in Eocene. Includes Claiborne, Buhrstone.

Claiborne stage, Lower, Vaughan. Am. Geol., vol. xv, p. 210. 1895.
Tertiary. Louisiana. Included in Eocene. Includes Mansfield group, Arcadia clays.

Claiborne, Lower, Vaughan. U. S. Geol. Surv., Bull. No. 142, p. 15. 1896.
Tertiary. Louisiana. Included in Eocene. Includes Jackson in part, Arcadia, Upper Lignitic in part, Marine Claiborne, Lower Claiborne in part, and Mansfield.

Claiborne-Meridian, McGee. U. S. Geol. Surv., 12th Ann. Rept., pt. i, p. 413. 1896.
Tertiary. Coastal Plain, Gulf States. Included in Eocene.

Claiborne, Lower, Vaughan. U. S. Geol. Surv., Bull. No. 142, p. 15. 1896.
Tertiary. Louisiana. Included in Eocene. Includes Ostrea sellæformis, Lisbon, Buhrstone, Calcareous and Siliceous Claiborne beds, Lerch's Jackson Arcadia, Upper Lignitic, Marine Claiborne, and Lower Lignitic, Mansfield group.

Claiborne sands, Dall. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, p. 340. 1898.
Tertiary. Alabama. Included in Claibornian stage, Eocene.

Claiborne stage, lower, Harris and Veatch. La. State Exp. Sta., pt. v, p. 73. 1899.
Tertiary. Louisiana. Included in Eocene.

Claibornian stage, Vaughan. U. S. Geol. Surv., Mon., vol. xxxix, p. 27. 1900.
Tertiary. Gulf States.

Clarion group, Rogers. Geol. of Pa., vol. ii, pp. 490, 501, 572. 1858.
Carboniferous. Pennsylvania. Included in Coal Measures.

Clarion sandstone, Stevenson. 2d Pa. Geol. Surv., Rept. K^3, p. 43. 1878.
Carboniferous. Pennsylvania. Included in Lower Productive series. Exact syn. Piedmont sandstone.

Clarion sandstone, Platt. 2d Pa. Geol. Surv., Rept. H^6, p. 323. 1880.
Carboniferous. Pennsylvania.

Clarion group, Chance. Pa. Geol. Surv., Rept. V^2, pp. 49–56. 1880.
Carboniferous. Pennsylvania. Included in Lower Productive Measures.

Clarion coal, White. U. S. Geol. Surv., Bull. No. 65, p. 175. 1891.
Carboniferous. Ohio, Pennsylvania, West Virginia. Included in Lower Coal Measures, Allegheny River series. Includes Upper and Lower Clarion. Part. syn. Scrub-grass coal.

Clarion group, White. Geol. Soc. Am., Bull., vol. xi, pp. 148–150. 1900.
Carboniferous. Pennsylvania. Included in Allegheny series.

Clark, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 26. 1896.
Carboniferous. Virginia, West Virginia. Included in Pottsville series.

Clark formation, White. U. S. Geol. Surv., 20th Ann. Rept., pt. ii, p. 814. 1900.
Carboniferous. Virginia, West Virginia.

Clark County Littorals, Hill. Ark. Geol. Surv., 1888, vol. ii, pp. 79, 80. 1888.
Cretaceous. Arkansas. Included in Upper Arenaceous beds.

Clarke's Mill shale, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, pp. 969–970, 972. 1892.
Silurian. Pennsylvania. Included in No. vi. Includes Pentamerus limestone, Delthyris shale.

Clarksburg limestone, White. U. S. Geol. Surv., Bull. No. 65, p. 88. 1891.
Carboniferous. Pennsylvania, West Virginia. Included in Barren Measures, Elk River series.

Clarksburg formation, Van Hise and Bayley. U. S. Geol. Surv., 15th Ann. Rept., p. 604. 1895.
Algonkian. Lake Superior Region. Included in Upper Marquette series.

Clarksburg formation, Bayley. U. S. Geol. Surv., Mon., vol. xxviii, pp. 460–486. 1897.
Algonkian. Michigan. Included in Upper Marquette series.

Clay marl formation, Clark. N. J. State Geol., Rept., 1892, pp. 186–190. 1893.
Cretaceous. New Jersey.

Clayton, Smith, Johnson, and Langdon. Ala. Geol. Surv., Geol. of Coastal Plain of Alabama, pp. 192, 198, 240, 413, 489. 1894.
Tertiary. Alabama. Included in Eocene. Exact syn. Midway.

Clear Creek limestone, Worthen. Ill. Geol. Surv., vol. i, pp. 126–129. 1866.
Devonian and Upper Silurian. Illinois. Part. syn. Lower Helderberg limestone and Oriskany sandstone of New York.

Clear Creek, limestone, Worthen. Ill. Geol. Surv., vol. iii, pp. 24–25, 37–38. 1868.
Devonian. Illinois. Included in Oriskany group.

Clear Creek sandstone, Broadhead. Mo. Geol. Surv., Rept. 1873–74, pp. 69, 100. 1874.
Carboniferous. Missouri. Included in Coal Measures.

Clear Creek bed, Drake. Texas Geol. Surv., 4th Ann. Rept., pp. 392–394. 1893.
Carboniferous. Texas. Included in Canyon division.

Clear Creek limestone, Keyes. Mo. Geol. Surv., vol. iv, pp. 30, 41, 42. 1894.
Silurian. Missouri. Included in Niagara stage.

Clear Creek, Wheeler. Mo. Geol. Surv., vol. xi, p. 41. 1896.
Silurian. Missouri.

Clear Creek limestone, Schuchert. Geol. Soc. Am., Bull., vol. xi, p. 317. 1900.
Devonian. Illinois. Included in Oriskany.

Clear Fork, Dumble. Texas Geol. Surv., 1st Ann. Rept., pl. iii, p. lxix. 1890.
Permian. Texas.

Clear Fork beds, Cummins. Texas Geol. Surv., 1st Ann. Rept., p. 188. 1890.
Permian. Texas.

Clear Fork beds, Cummins. Texas Geol. Surv., 2d Ann. Rept., pp. 401–402. 1891.
Permian. Texas.

Clear Fork division, Cummins. Texas Geol. Surv., 4th Ann. Rept., pp. 226–228. 1893.
Permian. Texas.

Clearwater shale, McConnell. Can. Geol. Surv., new ser., vol. v, pt. i, pp. 30D–32D, 55D–58D. 1893.
Cretaceous. Canada. Included in Colorado group.

Clepsydrops shale, Cope. U. S. Geol. and Geog. Surv. of Terr., Bull., vol. v, pp. 51–52. 1879.
Carboniferous. Illinois, Indiana.

Clermont limestone, Ashburner. 2d Pa. Geol. Surv., Rept. R^2, pp. 378–379. 1885.
Carboniferous. Pennsylvania.

Cleveland shale, Newberry. Ohio Geol. Surv., Rept. Prog. 1869, pp. 19, 21. 1870.
Carboniferous. Ohio.

Cleveland shale, Newberry. Ohio Geol. Surv., Rept. Prog., 1869, p. 22. 1871.
Carboniferous. Ohio. Included in Waverly group.

Cleveland shale, Read. Ohio Geol. Surv., vol. i, pp. 486, 514, 525. 1873.
Carboniferous. Ohio. Included in Waverly.

Cleveland shale, Newberry. Ohio Geol. Surv., vol. i, pt. i, pp. 189, 208. 1873.
Carboniferous. Ohio. Included in Waverly.

Cleveland shale, Newberry. Ohio Geol. Surv., vol. ii, pp. 92–95, 188, 213. 1874.
Carboniferous. Ohio. Included in Waverly, Lower Carboniferous.

Cleveland shale, Winchell. Ohio Geol. Surv., vol. ii, pp. 242, 263, 282. 1874.
Carboniferous. Ohio. Included in Waverly.

Cleveland shale, Lesley. 2d Pa. Geol. Surv., Rept. I, p. 75. 1875.
Devonian. Ohio, Pennsylvania. Exact syn. No. viii.

Cleveland shale, Hicks. Am. Jour. Sci., 3d ser., vol. xvi, p. 70. 1878.
Carboniferous. Ohio. Included in Waverly.

Cleveland shale, Orton. Rev. of Strat. Geol. of eastern Ohio, p. 2. 1880.
Devonian. Ohio.

Cleveland shale, Orton. Ohio Geol. Surv., vol. vi, pp. 4, 26. 1888.
Devonian. Ohio. Included in Ohio shale.

Cleveland shale, Herrick. Denison Univ. Sci. Lab., Bull., vol. iv, p. 106. 1888.
Ohio.

Cleveland shale, Orton. Ohio Geol. Surv., vol. vii, pp. 4, 21, 22. 1893.
Devonian. Ohio. Included in Ohio shale.

Cleveland County red sands, Hill. Ark. Geol. Surv., 1888, vol. ii, pp. 58–59. 1888.
Tertiary. Arkansas. Included in Camden series. Part. syn. Claiborne beds of Alabama and Mississippi.

Click series, Dumble. Texas Geol. Surv., 1st Ann. Rept., pl. iii, p. lvii. 1890.
Archean. Texas. Included in Fernandan system.

Cliff limestone, Locke. Ohio Geol. Surv., 2d Ann. Rept., by W. W. Mather, p. 211. 1838.
Silurian. Ohio.

Cliff limestone, Owen. Rept. on Geol. of Iowa, Wis., and Ill., p. 19. 1839.
Mississippi Valley.

Cliff limestone, Clapp. Phil. Acad. Nat. Sci., Proc., vol. i, pp. 178, 316. 1843.
Silurian. Ohio. Includes Niagara, Marcellus.

Cliff limestone, Daniels. Wis. Geol. Surv., Rept., 1853, p. 12. 1854.
Silurian. Wisconsin. Includes Corraline beds.

Cliff limestone, Newberry. Ohio Geol. Surv., Rept. Prog., 1869, p. 20. 1870.
Ohio. Includes Salina and Lower Helderberg formations with two other limestones and a bed of sandstone overlying.

Cliff limestone, Orton. Ohio Geol. Surv., Rept. Prog., 1869, pp. 141, 150. 1870.
Ohio. Includes Clinton and Niagara groups.

Cliff limestone, Newberry. Ohio Geol. Surv., Rept. Prog., 1869, p. 15. 1870.
Silurian. Ohio. Includes Salina and Water lime.

Cliff limestone, Orton. Geol. Surv. Ohio, Rept. Prog., 1870, p. 295. 1871.
Silurian. Ohio.

Cliff limestone, Newberry. Ohio Geol. Surv., p. 15. 1871.
Silurian. Ohio. Includes Salina and Lower Helderberg limestones.

Cliff limestone, Foerste. Denison Univ. Sci. Lab., Bull., vol. i, p. 64. 1885.
Ohio.

Clifton limestone, Safford and Killebrew. Elementary Geol. of Tenn., pp. 144–146. 1876.
Silurian. Tennessee. Included in Upper Silurian. Exact syn. Meniscus limestone.

Clinch Mountain sandstone, Safford. Geol. Reconn. in the State of Tenn., 1st Rept., p. 157. 1856.
Silurian(?). Tennessee. Included in Dyestone and Gray limestone group.

Clinch Mountain sandstone, Safford. Geol. of Tenn., pp. 292–299. 1869.
Silurian. Tennessee. Included in Niagara group. Part. syn. Medina sandstone of New York.

Clinch Mountain sandstone, Killebrew and Safford. Resources of Tenn., p. 37. 1874.
Silurian. Tennessee. Included in Niagara period.

Clinch sandstone, Campbell. Geol. Soc. Am., Bull., vol. v, pp. 171, 176. 1894
Silurian. Virginia. Included in Medina, Oneida.

Clinch sandstone, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folios Nos. 12, 26. 1894, 1896.

Silurian. Kentucky, Virginia, Tennessee.

Clinch sandstone, Keith. U. S. Geol. Surv., Geol. Atlas of U. S., Folios Nos. 25, 27. 1896.

Silurian. Tennessee.

Clinch sandstone, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 44. 1897.

Silurian. Virginia, West Virginia.

Clinch sandstone, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio 59. 1899.

Silurian. Virginia, Tennessee.

Clingman conglomerate, Keith. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 16. 1895.

Tennessee, North Carolina. Included in Ocoee group.

Clinton group, Vanuxem. Geol. of New York, pt. iii, pp. 79-90. 1842.

Paleozoic. New York. Includes Ferriferous slate and sandrock, No. 5 Pennsylvania survey. Part. syn. Protean group.

Clinton, Conrad. Phil. Acad. Nat. Sci., Jour., vol. viii, p. 230. 1842.

Included in Lower Silurian.

Clinton group, Hall. Geol. of New York, pt. iv, 4th Geol. Dist., pp. 18, 58-79. 1843.

Paleozoic. New York. Includes Pentamerus limestone of Clinton group. Exact syn. Protean, Ferriferous slate and sand rock.

Clinton group, Emmons. Agric. of New York, vol. i, pp. 144-150. 1846.

New York. Included in Ontario division of New York system.

Clinton group, Emmons. Agric. of New York, vol. i, pp. 144-150. 1846.

Silurian. New York. Included in Ontario division of New York system. Exact syns. Protean group, Ferriferous slate and sand rock.

Clinton group, Hall. Foster and Whitney's Rept. on Geol. of Lake Superior Dist., pt. ii, p. 152. 1851.

Silurian. Lake Superior region.

Clinton group, Hall. Paleontology of New York, vol. ii, pp. 2-4, 15-17. 1852.

Silurian. New York.

Clinton group, Hall. Am. Jour. Sci., 2d ser., vol. xvii, p. 192. 1854.

Silurian. Michigan.

Clinton formation, Logan. Can. Geol. Surv., Rept., 1843-63, pp. 310-321. 1863.

Silurian. Canada (Western). Included in Anticoste group.

Clinton formation, Bell. Can. Geol. Surv., Rept. 1866-69, pp. 127-128. 1871.

Silurian. Canada.

Clinton, Newberry. Ohio Geol. Surv., vol. i, pt. i, pp. 62, 103, 126. 1873.

Silurian. Ohio.

Clinton, Orton. Ohio Geol. Surv., vol. i, pt. i, p. 463. 1873.

Silurian. Ohio.

Clinton, Orton. Ohio Geol. Surv., vol. ii, p. 663. 1874.

Silurian. Ohio.

Clinton, Lesley. Am. Phil. Soc., Proc., vol. xiv, p. 103. 1874.

Silurian. Pennsylvania.

Clinton, Ashburner. Am. Phil. Soc., Proc., vol. xvi, pp. 531, 556. 1877.

Silurian. Appalachian region. Includes Olive shale. Exact syn. Surgent.

Clinton iron ore, Chamberlin. Geol. of Wisconsin, vol. ii, pp. 327-334. 1877.

Upper Silurian. Wisconsin.

Clinton, Ashburner. 2d Pa. Geol. Surv., Rept. F, pp. 248-260. 1878.

Silurian. Pennsylvania. Exact syn. Surgent.

Clinton, Orton. Ohio Geol. Surv., vol. iii, pp. 384, 407. 1878.
Silurian. Ohio.

Clinton, Newberry. Ohio Geol. Surv., vol. iii, p. 5. 1878.
Silurian. Ohio. Included in Upper Silurian.

Clinton, Hussey. Ohio Geol. Surv., vol. iii, pp. 441, 479. 1878.
Silurian. Ohio.

Clinton, Stevenson. Am. Phil. Soc., Proc., vol. xix, pp. 99, 228. 1880, 1881.
Silurian. Virginia.

Clinton, Platt. 2d Pa. Geol. Surv., Rept. T, pp. 42–44, 137–152. 1881.
Silurian. Pennsylvania. Exact syn. Surgent.

Clinton group, Miller. Cin. Soc. Nat. Hist., Jour., vol. iv, no. iv, pp. 268, 289. 1881.
Silurian.

Clinton, White. 2d Pa. Geol. Surv., Rept. G^6, pp. 147–149. 1882.
Silurian. Pennsylvania. Exact syn. No. v.

Clinton, Stevenson. 2d Pa. Geol. Surv., Rept. T^2, pp. 90–91. 1882.
Silurian. Pennsylvania.

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Devonian and Silurian. Maine.

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Silurian. Maine.

Cochran conglomerate, Hayes. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 20. 1895.
Cambrian. Tennessee. Included in Chilhowee series.

Cochran conglomerate, Keith. U. S. Geol. Surv., Geol. Atlas of U. S., Folios Nos. 16, 25. 1895, 1896.
Cambrian. Tennessee, North Carolina.

Cockeysville marble, Williams. U. S. Geol. Surv., Baltimore, Md. Geologic sheet. 1892.
Maryland.

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Tertiary. Louisiana. Included in Eocene.

Cocksfield Ferry beds, Vaughan. U. S. Geol. Surv., Bull. No. 142, p. 21. 1896.
Tertiary. Louisiana. Included in Eocene. Exact syn. Claiborne sands of Alabama.

Codorus limestone, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. i, p. 454. 1892.
Silurian. Pennsylvania. Included in Lower Silurian, No. ii (?).

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Devonian. New York. Included in Helderbergian.

Coeymans limestone, Weller. N. J. Geol. Surv., Rept. 1899, p. 28. 1900.
Devonian. New Jersey.

Coffee sand, Safford. Am. Jour. Sci., 2d ser., vol. xxxvii, pp. 362–364. 1864.
Cretaceous. Tennessee. Exact syn. Tombigbee sand.

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Cretaceous. Tennessee. Exact syn. Tombigbee sand.

Coffee sand, Killebrew and Safford. Resources of Tenn., pp. 42–43. 1874.
Cretaceous. Tennessee.

Coggan beds, Norton. Iowa Acad. Sci., Proc., vol. i, pt. iv, p. 23. 1894.
Silurian. Iowa. Included in (?) Silurian (uppermost).

Coggan beds, Norton. Iowa Geol. Surv., vol. iv, pp. 138–154. 1895.
Silurian. Iowa. Included in Upper Silurian.

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Cambrian (?). Georgia.

Coldbrook group, Matthew. Can. Nat., vol. viii, pp. 244, 246–247. 1863.
New Brunswick.

Coldbrook group, Bailey and Matthew. Can. Geol. Surv., Rept., 1870–71, pp. 59–85. 1873.
Archean. New Brunswick. Included in Huronian.

Coldbrook group, Bailey and Matthew. Can. Geol. Surv., Rept., 1875–76, pp. 350–352. 1877.
Huronian (?). New Brunswick.

Coldwater shales, Lane. Mich. Geol. Surv. Rept. State Board for 1891–92, p. 66. 1893.
Sub-Carboniferous. Michigan.

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Michigan. Exact syn. Cuyahoga shale of Ohio.

Coldwater group, Dawson. Can. Geol. Surv., new ser., vol. vii, pp. 26B, 65B–66B, 68B–71B, 160B–164B. 1896.
Tertiary. British Columbia. Exact syn. Oligocene.

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Carboniferous. Michigan. Part. syns. Waverly and Cuyahoga.

Coldwater shale, Gordon. Mich. Geol. Surv., vol. vii, pt. iii, p. 7. 1900.
Carboniferous. Michigan.

Coldwater shale, Lane. Mich. Geol. Surv., vol. vii, pt. ii, pp. 24, 86. 1900.
Carboniferous. Michigan. Exact syn. Cuyahoga.

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Cambrian. Missouri. Included in Gasconade limestone, Ozark series. Part. syn. St. Joseph limestone.

Coleman-Albany, Dumble. Texas Geol. Surv., 1st Ann. Rept. pl. iii, p. lxvii. 1890.
Carboniferous. Texas. Included in Coal Measures.

Coleman division, Tarr. Am. Geol., vol. vi, p. 152. 1890.
Carboniferous. Texas. Included in Upper Carboniferous.

Coleman beds, Tarr. Texas Geol. Surv., Bull. No. 3, pp. 14–15. 1892.
Carboniferous. Texas.

Coleman bed, Drake. Texas Geol. Surv., 4th Ann. Rept., p, 424. 1893.
Carboniferous. Texas. Included in Albany division.

Coles Brook limestone, Emerson. U. S. Geol. Surv., Mon., vol. xxix, p. 27. 1898.
Algonkian. Massachusetts.

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Pre-Cambrian. Massachusetts. Exact syn. Hinsdale limestone.

Coles Brook limestone, Emerson. U. S. Geol. Surv., Bull. No. 159, pp. 41–43. 1899.
Pre-Cambrian. Massachusetts.

College Hill limestone, Safford. Geol. of Tenn., p. 276. 1869.
Silurian. Tennessee. Included in Nashville formation.

Collinsville limestone, Worthen. Econ. Geol. of Ill., vol. iii, p. 332. 1882.
Carboniferous. Illinois. Included in Coal Measures.

Colorado group, Endlich. U. S. Geol. and Geog. Surv. of Terr., 9th Ann. Rept., pp. 126, 183, 192–215. 1877.
Cretaceous. Colorado. Exact syn. Cretaceous, No. 2.

Colorado, Hague. U. S. Geol. Explor. of 40th Parallel, vol. ii, pp. 28, 41–45. 1877.
Cretaceous. Colorado. Includes Fort Benton, Niobrara, and Fort Pierre.

Colorado group, King. U. S. Explor. of 40th Parallel, vol. i, pp. 305–320. 1878.
Cretaceous. Colorado, Wyoming, Utah. Includes Fort Benton (Cretaceous, No. 2), Niobrara (Cret. No. 3), and Fort Pierre (Cret. No. 4).

Colorado, White. U. S. Geol. and Geog. Surv. of Terr., 10th Ann. Rept., pp. 19, 22, 30. 1878.
Cretaceous. Utah, Colorado.

Colorado, Endlich. U. S. Geol. and Geog. Surv. of Terr., 10th Ann. Rept., pp. 75, 109, 126. 1878.
Cretaceous. Colorado.

Colorado, Stevenson. Chief of Engineers' Rept., 1879, pt. iii, p. 2254. 1879.
Cretaceous. New Mexico. Includes Fort Benton, Niobrara, and Fort Pierre.

Colorado, Endlich. U. S. Geol. and Geog. Surv. of Terr., 11th Ann. Rept., pp. 85, 87, 109, 122. 1879.
Cretaceous. Wyoming.

Colorado group, Stevenson. U. S. Geog. and Geol. Surv. of 100th M., vol. iii, Suppl., p. 95. 1881.

Cretaceous. Colorado, New Mexico. Includes Fort Benton, Niobrara, and Fort Pierre of Meek and Hayden, Nos. 2, 3, 4, and Middle Cretaceous of Newberry.

Colorado group, Dutton. U. S. Geol. Surv., 6th Ann. Rept., pp. 136–140. 1885.

Cretaceous. NW. New Mexico. Includes Dakota sandstone, and Colorado shales.

Colorado, White. U. S. Geol. Surv., Bull. No. 82, pp. 158, 261. 1891.

Cretaceous. Rocky Mts. Includes Niobrara and Fort Benton. Exact syns. Austin limestone and Eagle Ford shale.

Colorado formation, Cannon. Colo. Sci. Soc., Proc., vol. iv, p. 248. 1893.

Cretaceous. Colorado.

Colorado, Weed. U. S. Geol. Surv., Bull. No. 106, p. 17. 1893.

Cretaceous. Montana.

Colorado, Stanton. U. S. Geol. Surv., Bull. No. 106. 1893.

Cretaceous. Rocky Mountains.

Colorado, Iddings and Weed. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 1. 1894.

Cretaceous. Montana. Includes Benton and Niobrara.

Colorado, Cross. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 7. 1894.

Cretaceous. Colorado.

Colorado, Bain. Iowa Geol. Surv., vol. v, pp. 273–275. 1896.

Cretaceous. Iowa. Includes Benton and Niobrara.

Colorado, Peale. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 24. 1896.

Cretaceous. Montana

Colorado, Emmons, Cross, and Eldridge. U. S. Geol. Surv., Mon., vol. xxvii, pp. 26, 64. 1896.

Cretaceous. Colorado. Includes Benton, Niobrara.

Colorado, Weed. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 30. 1896.

Cretaceous. Wyoming. Includes Benton and Niobrara.

Colorado group, Weed and Pirsson. U. S. Geol. Surv., Bull. No. 139, p. 45. 1896.

Cretaceous. Montana. Includes Benton and Niobrara.

Colorado, Bain. Iowa Geol. Surv., vol. viii, pp. 330–335. 1898.

Cretaceous. Iowa.

Colorado formation, Spurr. U. S. Geol. Surv., Mon., vol. xxxi, pp. 41–42. 1898.

Cretaceous. Colorado. Includes Benton shales and Niobrara limestone.

Colorado formation, Weed. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 55. 1899.

Cretaceous. Montana.

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Cretaceous. Yellowstone Park.

Colorado formation, Logan. Jour. of Geol., vol. vii, pp. 83–91. 1899.

Cretaceous. Kansas and Nebraska. Includes Fort Benton and Niobrara.

Colorado formation, Todd. U. S. Geol. Surv., Water-Supply paper, No. 34, p. 15. 1900.

Cretaceous. South Dakota.

Columbia formation, McGee. U. S. Geol. Surv., 7th Ann. Rept., p. 594. 1888.

Pleistocene. Maryland.

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Pleistocene. Atlantic Coast region.

Columbia, McGee. Am. Assoc. Adv. Sci., Proc., vol. xxxvi, pp. 221–222. 1888.

Pleistocene. Atlantic Coastal Plain.

Columbia formation, McGee. U. S. Geol. Surv., 12th Ann. Rept., pt. i, p. 384. 1891.

Pleistocene. Atlantic Coastal Plain.

Columbia, McGee. Am. Assoc. Adv. Sci., Proc., vol. xxxix, p. 245. 1891.

Pleistocene. *Mississippi Valley.*

Columbia, McGee. Smithsonian Inst. Rept., 1890, p. 72. 1891.
Pleistocene. District of Columbia.

Columbia, Darton. Geol. Soc. Am., Bull., vol. ii, p. 432. 1891.
Pleistocene. Virginia, Maryland.

Columbia series, Spencer. Ga. Geol. Surv., 1st Rept. of Prog., pp. 61–72. 1891.
Tertiary. Georgia.

Columbia, Darton. U. S. Geol. Surv., Baltimore, Md., Geologic sheet. 1892.
Pleistocene. Maryland.

Columbia, Williams and Clark. Maryland. Its Resources, Industries, and Institutions, pp. 74, 83. 1893.
Pleistocene. Maryland.

Columbia, McGee, Darton, Williams. Int. Cong. Geol., 5th sess., pp. 232–233, 246. 1893.
Pleistocene. Maryland, District of Columbia.

Columbian gravels, Grimsley. Cin. Soc. Nat. Hist., Jour., vol. xvii, No. i, p. 59. 1894.
Maryland.

Columbia, Darton. U. S. Geol. Surv., Geol. Atlas of U. S., Folios Nos. 13, 23. 1894, 1896.
Pleistocene. Virginia, Maryland.

Columbia, Hershey. Am. Geol., vol. xv, p. 7. 1895.
Pleistocene. Illinois. Includes Florence gravel, Valley loess, Upland loess.

Columbia, Hershey. Am. Geol., vol. xvi, p. 352. 1895.
Pleistocene. Missouri.

Columbia, Darton. U. S. Geol. Surv., Bull. No. 138, pp. 119, 126, 164, 210. 1896.
Pleistocene. Atlantic Coastal Plain.

Columbia formation, Clark. Md. Geol. Surv., vol. i, p. 199. 1897.
Pleistocene. Maryland.

Columbia formation, Spencer. Geol. Soc. Am. Bull., vol. ix, p. 25. 1897.
Pleistocene. Mexico.

Columbus limestone, Mather. Rept. State House Artesian Well at Columbus, Ohio, p. 6. 1859.
Ohio.

Columbus limestone, Orton. Ohio Geol. Surv., vol. vi, p. 763. 1888.
Ohio.

Columbus limestone, Orton. Ohio Geol. Surv., 3d Organization, 1st Ann. Rept. p. 25. 1890.
Devonian. Ohio. Included in Upper Helderberg limestone. Exact syn. Lower Corniferous.

Columbus beds, Brownocker. Denison Univ. Sci. Lab., Bull., vol. ii, Art. ii, p. 13. 1898.
Devonian. Ohio.

Colvins Run limestone, White. U. S. Geol. Surv., Bull., No. 65, p. 39. 1891.
Carboniferous. Pennsylvania. Included in Permo-Carboniferous, Dunkard Creek series. Exact syn. Limestone 1 (a), Stevenson.

Comanche series, Hill. Am. Jour. Sci., 3d ser., vol. xxxiii, p. 298, 1887; vol. xxxiv, p. 299, 1887.

Comanche series, Hill. Ark. Geol. Surv., 1888, vol. ii, pp. 67, 110–116, 126. 1888.
Cretaceous. Arkansas. Includes Washita, Fredericksburg, and Trinity divisions.

Comanche series, Hill. Texas Geol. Surv., 1st Ann. Rept., pp. 116–141. 1890.
Cretaceous. Texas. Included in Lower Cretaceous. Includes Trinity sands, Fredericksburg division, Comanche Peak subdivision, Caprina chalk, Washita division, Austin marble, Fort Worth limestone, Shoal Creek limestone, and Denison beds.

Comanche series, Dumble. Texas Geol. Surv., 1st Ann. Rept., pl. iii, pp. i-iv. 1890.

Cretaceous. Texas. Includes Washita, Fredericksburg, and Trinity divisions.

Comanche series, Hill. Geol. Soc. Am., Bull., vol. ii, p. 503. 1891.

Cretaceous. Texas.

Comanche, White. U. S. Geol. Surv., Bull., No. 82, pp. 119, 253. 1891.

Cretaceous. Texas.

Comanche series, Hill. Am. Jour. Sci., 3d ser., vol. xlv, pp. 313-318. 1893.

Cretaceous. Mexico, Texas.

Comanche series, Hill. Amer. Jour. Sci., 3d ser., vol. l, pp. 205-234. 1895.

Cretaceous. Kansas, Oklahoma, and New Mexico.

Comanche series, Stanton. Jour. of Geol., vol. v, pp. 599-610. 1897.

Cretaceous. Included in Lower Cretaceous.

Comanche series, Prosser. Kan. Univ. Geol. Surv., vol. ii, pp. 96-181. 1897.

Lower Cretaceous. Kansas. Includes Cheyenne sandstone and Kiowa shales.

Comanche series, Gould. Am. Jour. Sci., 4th ser., vol. v, pp. 169-175. 1898.

Cretaceous. Kansas. Includes Kiowa shales and Cheyenne sandstone.

Comanche series, Vaughan. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 64. 1900.

Cretaceous. Texas. Includes Glen Rose formation, Comanche Peak limestone, Edwards limestone, Georgetown limestone, Del Rio clay, Buda limestone.

Comanche Creek bed, Drake. Texas Geol. Surv., 4th Ann. Rept., p. 385. 1893.

Carboniferous. Texas. Included in Strawn division.

Comanche Peak group, Shumard. St. Louis Acad. Sci., Trans., vol. i, pp. 583, 584. 1857.

Cretaceous. Texas.

Comanche Peak group, Marcou. Boston Soc. Nat. Hist., Proc., vol. viii, 1861-62, p. 89. 1861.

Cretaceous. Texas. Included in Upper Cretaceous.

Comanche Peak bed, Hill. Texas Geol. Surv., 1st Ann. Rept., pp. 123-124. 1890.

Cretaceous. Texas. Included in Fredericksburg division of Comanche series.

Comanche Peak division, Hill. Geol. Soc. Am., Bull., vol. ii, pp. 503, 512. 1891.

Cretaceous. Texas.

Comanche Peak limestone, Taff. Texas Geol. Surv., 3d Ann. Rept., pp. 340. 1892.

Cretaceous. Texas. Included in Fredericksburg division of Lower Cretaceous.

Comanche Peak series, Dumble and Cummins. Am. Geol., vol. ix, p. 349. 1892.

Cretaceous. Texas.

Comanche Peak chalk, Hill. Artesian Invest., Final Rept., pt. iii, p. 86, 52d Cong., 1st sess., Ex. Doc. 41, pt. iii. 1892.

Cretaceous. Texas. Included in Trinity division.

Comanche Peak limestone, Taff. Texas Geol. Surv., 4th Ann. Rept., pp. 256-257. 1893.

Cretaceous. Texas. Included in Fredericksburg division of Lower Cretaceous.

Comanche Peak beds, Hill. Geol. Soc. Am., Bull., vol. v, p. 302. 1894.

Cretaceous. Texas. Includes Goodland and Walnut.

Comanche Peak stage, Dumble. Geol. Soc. Am., Bull., vol. vi, p. 378. 1895.

Cretaceous. Texas. Included in Lower Cretaceous.

Comanche Peak limestone, Hill and Vaughan. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, p. 226. 1898.

Cretaceous. Texas. Included in Fredericksburg division of Comanche series.

Comanche Peak formation, Hill and Vaughan. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 42. 1898.

Cretaceous. Texas. Included in Comanche series

Comanche Peak limestone, Vaughan. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 64. 1900.
Cretaceous. Texas. Included in Comanche series.

Comet Creek bed, Hill. Am. Jour. Sci., 3d ser., vol. l, pp. 228–229. 1895.
Cretaceous. Oklahoma. Included in Comanche.

Como stage, Knight. Geol. Soc. Am., Bull., vol. xi, pp. 383–385. 1900.
Jurassic. Wyoming.

Conanicut arkose, Shaler, Woodworth, and Foerste. U. S. Geol. Surv., Mon., vol. xxxiii, p. 380. 1889.
Carboniferous. Rhode Island.

Conasauga shale, Hayes. Geol. Soc. Am., Bull., vol. ii, p. 143. 1890.
Ordovician (?). Tennessee. Exact syn. Knox shale.

Conasauga, Walcott. U. S. Geol. Surv., Bull., No. 81, p. 246. 1891.
Cambrian. Georgia. Exact syn. Knox shale, Montevallo, Choccolocco.

Conasauga shale, Hayes. Ala. Geol. Surv., Bull., No. 4, pp. 34, 39. 1892.
Cambrian. Alabama.

Conasauga shale, Hayes. Geol. Soc. Am., Bull., vol. v, p. 467. 1894.
Cambrian. Georgia.

Conasauga shale, Hayes. U. S. Geol. Surv., Geol. Atlas of U. S., Folios Nos. 2, 4, 6, 20, 35. 1894–95, 1896.
Cambrian. Georgia, Tennessee.

Conasauga shale, Hayes. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 35. 1896.
Cambrian. Alabama. Exact syns. Montevallo or Choccolocco shale, Knox shale.

Conasauga shale, Keith. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 33. 1896.
Cambrian. Tennessee. Includes Nolichucky shale and Marysville limestone. Exact syn. Knox shale.

Conasauga shale, Keith. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 25. 1896.
Cambrian. Tennessee.

Conception slates, Walcott. Geol. Soc. Am., Bull., vol. x, p. 220. 1899.
Algonkian. Newfoundland. Included in Avalon terrane.

Concretionary limestone, Worthen. Iowa Geol. Surv., vol. i, pt. i, pp. 190–191, 201, 215–216, 226–227, 236–237, 242–243, 254–255. 1858.
Carboniferous. Iowa.

Concretionary limestone, Hopkins. Ark. Geol. Surv., 1890, vol. iv, p. 55. 1890.
Carboniferous. Arkansas. Included in Lower Carboniferous.

Conemaugh formation, O'Harra. Md. Geol. Surv., Allegany County, p. 118. 1900.
Carboniferous. Maryland.

Conemaugh formation, Clark. Md. Geol. Surv., Phys. Atlas of Md., Allegany County. 1900.
Carboniferous. Maryland.

Conglomerate series, Fontaine. Am. Jour. Sci., 3d ser., vol. vii, pp, 463–465. 1874.
Carboniferous. West Virginia.

Conglomerate series, Fontaine. Am. Jour. Sci., 3d ser., vol. xi, p. 374. 1876.
Carboniferous. West Virginia.

Conglomerate Measures, White. 2d Pa. Geol. Surv., Rept. Q, pp. 33–58. 1880.
Carboniferous. Pennsylvania. Includes Homewood sandstone, Mercer shales, Connoquenessing sandstone, Sharon conglomerate. Exact syn. No. xii.

Conglomerate group, Orton. Ohio Geol. Surv., vol. vi, p. 43. 1888.
Carboniferous. Ohio. Includes Homewood sandstone, Upper Mercer group, Lower Mercer group, Massillon sandstone, Upper Massillon sandstone, Lower Sharon conglomerate.

Conglomerate group, Squire. Ala. Geol. Surv., Rept. on Cahaba Coal field, pp. 14 et seq. 1890.
Carboniferous. Alabama. Included in Coal Measures.

Conglomerate group, Orton. Ohio Geol. Surv., 3d Organization, 1st Ann. Rept., pp. 43-44. 1890.

Carboniferous. Ohio. Includes Homewood sandstone, Mercer group, Massillon sandstones, and Sharon conglomerate.

Connecticut River sandstone, Hitchcock. Am. Assoc. Adv. Sci., Proc., vol. ix, p. 225. 1855.

Juratrias. Massachusetts.

Connecticut River sandstone, Emmons. St. Louis Acad. Sci., Trans., vol. i, p. 102. 1857.

Connecticut.

Connecticut sandstone, Hitchcock. Science, new ser., vol. i, pp. 74-77. 1895.

Juratrias. Connecticut. Exact syn. Newark or Connecticut River sandstone.

Connecticut River sandstone, Emerson. U. S. Geol. Surv., Mon., vol. xxix, pp. 351-406. 1898.

Juratrias. Massachusetts. Included in Trias. Includes Sugar Loaf arkose, Mount Toby conglomerate, Longmeadow brownstone, Chicopee shale, Granby tuff, Holyoke, Deerfield, and Black Rock beds. Part. syn. Newark.

Connellsville sandstone, Platt. 2d Pa. Geol. Geol. Surv., Rept. H^4, p. 312. 1878.

Carboniferous. Pennsylvania.

Connellsville sandstone, White. U. S. Geol. Surv., Bull. No. 65, p. 87. 1891.

Carboniferous. Pennsylvania, West Virginia. Included in Barren Measures, Elk River series.

Connellsville sandstone, White. Geol. Soc. Am., Bull., vol. iii, p. 189. 1892.

Upper Carboniferous. West Virginia. Included in Elk River series.

Connoquenessing sandstone, Platt. 2d Pa. Geol. Surv., Rept. H^5, p. 325. 1880.

Carboniferous. Pennsyivania.

Connoquenessing sandstone, White. U. S. Geol. Surv., Bull. No. 65, p. 201. 1891.

Carboniferous. Ohio and Pennsylvania. Included in Pottsville conglomerate series. Part. syn. Massillon sandstone.

Connoquenessing sandstone, D'Invilliers. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. i, p. 1911. 1895.

Carboniferous. Pennsylvania. Exact syn. Massillon sandstone of Ohio.

Conshohocken clay, Hopkins. Geol. Soc. Am., Bull., vol. x, pp. 480-484. 1900.

Pennsylvania.

Contra Costa lake bed, Cooper. Cal. Acad. Sci., Proc., 1893-94, 2d series, vol. iv, p. 169. 1895.

Pliocene. California. Included in Pliocene fresh-water beds.

Conway schist, Emerson. U. S. Geol. Surv., Geol. Atlas of U. S., Hawley sheet. 1892.

Silurian. Massachusetts.

Conway schists, Emerson. Geol. Soc. Am., Bull., vol. vii, p. 5. 1895.

Ordovician? Massachusetts.

Conway schists, Emerson. U. S. Geol. Surv., Mon., vol. xxix, pp. 177-200. 1898.

Silurian. Massachusetts.

Conway schist, Emerson. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 50. 1898.

Silurian. Massachusetts.

Cook Inlet gravels, Spurr. U. S. Geol. Surv., 20th Ann. Rept., pt. vii, pp. 174-175. 1900.

Pleistocene. Alaska.

Cook's Mountain beds, Dumble. Texas Geol. Surv., Rept. on brown coal, pp. 141-143. 1892.

Tertiary. Texas. Included in Timber Belt division of Eocene.

Cook's Mountain series, Kennedy. Texas Geol. Surv., 3d Ann. Rept., pp. 54-57. 1892.

Tertiary. Texas. Included in Timber Belt beds of Eocene.

Coon Mountain bed, Drake. Texas Geol. Surv., 4th Ann. Rept., p. 417. 1893.

Carboniferous. Texas. Included in Cisco division.

Cooper marble, Meek. Mo. Geol. Surv., Repts. 1855-1871, p. 176. 1873.

Carboniferous. Missouri.

Cooper River beds, Pratt. Ashley river phosphates. 1868.

Tertiary. South Carolina. Included in Eocene.

Cooper River beds, Holmes. Phosphate Rock of South Carolina. 1878.

Tertiary. South Carolina. Included in Eocene. Part. syn. Eocene marl.

Cooper River marls, Dall. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, p. 342. 1898.

Tertiary. South Carolina. Included in Vicksburgian stage, Oligocene.

Coos group, Hitchcock. Boston Soc. Nat. Hist., Proc., vol. xv, 1872-73, p. 307. 1873.

New Hampshire. Includes Calciferous mica schists.

Coos group, Hitchcock. Am. Jour. Sci., 3d ser., vol. vii, pp. 474-475. 1874.

New Hampshire.

Coos quartzite, Huntington. Geol. of New Hamp., pt. ii, pp. 412-421. 1877.

Paleozoic. New Hampshire.

Coos group, Huntington. Geol. of New Hamp., pt. ii, pp. 38-47, 316-320, 372, 442. 1877.

Paleozoic. New Hampshire. Includes Coos quartzite.

Coos group, Hitchcock. Jour. of Geol., vol. iv, p. 55. 1896.

Silurian (?). New Hampshire.

Coos group, Hitchcock. Geol. Soc. Am., Bull., vol. vii, p. 510. 1896.

Cambrian. Vermont.

Coos conglomerate, Dall. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, p. 336. 1898.

Pleistocene. Oregon.

Coosa shale, Hayes. Geol. Soc. Am., Bull., vol. ii, p. 143. 1890.

Cambrian (?). Tennessee, Georgia.

Coosa shale, Smith. Ala. Geol. Surv., Rept. on Cahaba Coal field, p. 148. 1890.

Cambrian. Alabama.

Coosa, Walcott. U. S. Geol. Surv., Bull., No. 81, p. 247. 1891.

Cambrian. Alabama and Georgia.

Coosa shale, Hayes. Ala. Geol. Surv., Bull., No. 4, pp. 34, 35. 1892.

Cambrian. Alabama.

Coosa shale, Gibson. Ala. Geol. Surv., Geol. Struct. of Murphrees Valley, pp. 26, 90. 1893.

Cambrian. Alabama. Exact syn. Sparry limestone.

Coosa shales, McCalley. Ala. Geol. Surv., Rept. on Valley regions, pt. ii, pp. 42-44, 189-191, 254-256, 311-314, 453-456, 484-485, 514-516, 588-593, 712-713, 767-768. 1897.

Cambrian. Alabama. Exact syn. Flatwood shales, Conasauga.

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Dunvegan group, McConnell. Can. Geol. Surv., new ser., vol. v, pt. i, pp. 50D, 54D-55D. 1893.
Cretaceous. Canada. Part. syn. Belly River series, Bear River beds (Wyoming).

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Tertiary. North Carolina.

Duplin beds, Dall. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, p. 338. 1898.
Tertiary. North Carolina.

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Devonian and Silurian. Tennessee. Included in Upper Silurian and Devonian. Includes Sneedville limestone and Clinch Mountain limestone.

Dyestone group, Safford. Geol. of Tenn., pp. 302-311. 1869.
Silurian. Tennessee. Included in Niagara group. Part. syn. Clinton. [Medina in part (?).]

Dyestone group, Killebrew and Safford. Resources of Tenn., p. 38. 1874.
Silurian. Tennessee. Included in Niagara period.

Eagle limestone, White. U. S. Geol. Surv., Bull. No. 65, p. 177. 1891.
Carboniferous. West Virginia. Included in Lower Coal Measures, Allegheny River series.

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Cretaceous. Montana.

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Cretaceous. Texas. Included in Gulf series.

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Texas. Included in Cretaceous. Gulf series. Exact syns. Tombigbee sand, Lower part of Colorado group.

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Cretaceous. Texas. Included in Black Prairie series.

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Cretaceous. Texas. Included in Black Prairie series.

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Cretaceous. Texas.

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Cretaceous. Texas. Included in Upper Cretaceous. Exact syn. Benton shale.

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Cretaceous. Texas. Included in Upper Cretaceous.

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Cretaceous. Southwest. Exact syn. Benton clay.

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Cretaceous. Texas. Included in Upper Cretaceous.

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Cretaceous. Texas.

Eagle Ford stage, Dumble. Geol. Soc. Am., Bull., vol. vi, p. 377. 1895.
Cretaceous. Texas. Included in Upper Cretaceous.

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Cretaceous. Texas. Included in Colorado division of Gulf series.

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Cretaceous. Texas. Included in Gulf series.

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Cretaceous. Texas.

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Cretaceous. Texas. Exact syn. Ripley formation.

Eagle Pass division, Dumble. Geol. Soc. Am., Bull., vol. iii, pp. 219, 224. 1892.
Cretaceous. Texas. Included in Upper Cretaceous. Includes Upson clays, San Miguel, Coal series, Escondido beds.

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Cretaceous. Texas.

Eagle Pass formation, Hill and Vaughan. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, p. 241. 1898.
Cretaceous. Texas. Included in Montana division of Gulf series.

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Cretaceous. Texas. Includes San Miguel beds, Escondido beds.

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Carboniferous. Iowa. Included in Bethany limestone.

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Carboniferous. Missouri. Included in Bethany limestone.

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Carboniferous. Kansas. Included near summit of Thayer shale.

East Lee gneiss, Emerson. U. S. Geol. Surv., Geol. Atlas of U. S., Hawley sheet. 1892.
Algonkian. Massachusetts. Part. syn. Stamford gneiss.

East Lee limestone, Emerson. U. S. Geol. Surv., Bull. No. 159, p. 50. 1899.
Pre-Cambrian. Massachusetts.

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Algonkian. Michigan.

Eastern sandstone, Irving and Chamberlin. U. S. Geol. Surv., Bull. No. 23. p. 106. 1885.
Cambrian. Michigan. Exact syn. Potsdam.

Eastern sandstone, James. Cin. Soc. Nat. Hist., Jour., vol. xvii, No. ii, p. 127. 1894.
Ordovician.

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Michigan.

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Ohio.

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Cambrian. Wisconsin. Included in Potsdam sandstone.

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Tertiary. Florida. Included in Miocene.

Edison gneiss, Wolff and Brooks. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, p. 439. 1898.
Pre-Cambrian. New Jersey.

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Canada. Included in Laramie.

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Edwards formation, Hill and Vaughan. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 42. 1898.
Cretaceous. Texas. Included in Comanche series.

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Ordovician. Massachusetts. Included in Mount Washington series.

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Carboniferous. Kansas. Included in Coal Measures.

Elevator B sandstone, Hall. Minn. Acad. Nat. Sci., Bull., vol. ii, no. i, p. 132. 1889.
Cambrian. Minnesota. Included in Shakopee.

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Ordovician(?). Minnesota. Included in Magnesian series.

Elgin sandstone, Haworth. Kan. Univ. Geol. Surv., vol. iii, p. 64. 1898.
Carboniferous. Kansas.

Elk group, Carll. 2d Pa. Geol. Surv., Rept. I^5, pp. 78–79. 1890.
Devonian. Pennsylvania.

Elk Creek beds, Cragin. Am. Geol., vol. xvi, p. 366. 1895.
Cretaceous. Kansas. Includes Lanphier beds, Stokes sandstone.

Elk Falls limestone, Haworth. Kan. Univ. Geol. Surv., vol. iii, pp. 65–66, 105. 1898.
Carboniferous. Kansas. Includes Lecompton and Deer Creek limestone.

Elkgarden, Darton and Taff. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 28. 1896.
Carboniferous. West Virginia and Maryland.

Elkgarden formation, Clark. Md. Geol. Surv., vol. i, p. 156, 187. 1897.
Carboniferous. Maryland.

Elk Lick limestone, White. 2d Pa. Geol. Surv., Rept. Q, p. 29. 1878.
Carboniferous. Pennsylvania. Included in Lower Barren series.

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Carboniferous. Pennsylvania. Included in Barren Measures, Elk River series.

Elk Lick Coal, White. U. S. Geol. Surv., Bull. No. 65, p. 89. 1891.
Carboniferous. Ohio, Pennsylvania, West Virginia. Included in Barren Measures, Elk River series.

Elk Mountain shale, White. 2d Pa. Geol. Surv., Rept. G^5, p. 64. 1881.
Devonian. Pennsylvania. Included in Catskill.

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Devonian. Pennsylvania. Included in Catskill, No. ix.

Elk Mountain sandstone and shale, Prosser. U. S. Geol. Surv., Bull. No. 120, p. 78. 1894.

Devonian. New York, Pennsylvania. Included in Catskill (Upper Devonian).

Elk River series, White. U. S. Geol. Surv., Bull. No. 65, p. 70. 1891.

Carboniferous. Ohio, Pennsylvania, and West Virginia. Includes Pittsburg limestone, Connellsville sandstone, Clarksburg limestone, Morgantown sandstone, Elk Lick limestone, Crinoidal, Green fossiliferous or Ames limestone, Red Shale beds, Cambridge limestone, Irondale limestone, Mahoning sandstone and limestone, and Kanawha black flint. Exact syn. Barren Measures.

Elk River series, White. Geol. Soc. Am., Bull., vol. iii, p. 189. 1892.

Upper Carboniferous. West Virginia. Exact syn. Barren Measures.

Elk River series, White. West Virginia Geol. Surv., vol. i, p. 201. 1899.

Carboniferous. West Virginia. Exact syn. Barren Measures.

Ellensburg sandstone, Russell. U. S. Geol. Surv., 20th Ann. Rept., pt. ii, pp. 127–128. 1900.

Tertiary. Washington. Included in Miocene.

Ellicottsville conglomerate, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, p. 1531. 1892.

Devonian. Pennsylvania. Included in Venango.

Elliott Creek bed, Drake. Texas Geol. Surv., 4th Ann. Rept., p. 376. 1893.

Carboniferous. Texas. Included in Strawn division.

Ellis limestone, Iddings and Weed. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 1. 1894.

Juratrias. Montana.

Ellis, Weed. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 30. 1896.

Juratrias. Wyoming.

Ellis, Peale. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 24. 1896.

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Juratrias. Montana.

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Juratrias. Montana.

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Juratrias. Yellowstone Park.

Elm Creek bed, Drake. Texas. Geol. Surv., 4th Ann. Rept., p. 424. 1893.

Carboniferous. Texas. Included in Albany division.

Elmont limestone, Beede. Kan. Acad. Sci., Trans., vol. xv, p. 30. 1898.

Carboniferous. Kansas.

Empire beds, Dall. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, p. 308. 1898.

Tertiary. Oregon. Included in Miocene. Exact syn. Astoria sandstones.

Empire formation, Diller. U. S. Geol. Surv., 19th Ann. Rept., pt. iii, p. 319. 1899.

Tertiary. Oregon. Included in Miocene.

Empire shale, Walcott. Geol. Soc. Am., Bull., vol. x, pp. 199, 207. 1899.

Algonkian, Pre-Cambrian. Montana. Included in Belt terrane.

Emporia limestone, Kirk. Kan. Univ. Geol. Surv., vol. i, p. 80. 1896.

Carboniferous. Kansas.

Encrinal limestone, Hall. N. Y. Geol. Surv., 3d Ann. Rept., p. 298. 1839.

Devonian. New York.

Encrinal limestone, Hall. Geol. of New York, pt. iv, 4th Geol. Dist., pp. 18, 187. 1843.

Paleozoic. New York. Included in Hamilton group.

Encrinal limestone, Hall. Geol. of New York, pt. iv, 4th Geol. Surv., pp. 18, 145. 1843.

Paleozoic. New York. Included in New York system. Includes Scutella limestone. Part. syn. No. 6, Pennsylvania survey.

Encrinal limestone, Emmons. Agriculture of New York, vol. i, p. 168. 1846.

New York. Included in Helderberg division of New York system.

Encrinal limestone, Hopkins. Ark. Geol. Surv., 1890, vol. iv, p. 52. 1890.

Silurian. Arkansas. Included in Lower Helderberg.

Encrinal limestone, Grabau. Buffalo Soc. Nat. Hist., Bull., vol. vi, pp. 30–32. 1898.

Devonian. New York.

Encrinital limestone, Shumard. Mo. Geol. Surv., 1st and 2d Ann. Repts., pt. ii, pp. 171, 181, 1855.

Carboniferous. Missouri.

Encrinital limestone, Swallow. Mo. Geol. Surv., 1st and 2d Ann. Repts., pp. 97, 175, 194. 1855.

Carboniferous. Missouri. Included in Mountain or Lower Carboniferous limestone.

Encrinital limestone, Meek. Mo. Geol. Surv., 1st and 2d Ann. Repts., pt. ii, p. 98. 1855.

Carboniferous. Missouri.

Encrinital limestone, Shumard. Mo. Geol. Surv., Repts., 1855–1871, pp. 294, 305. 1873.

Carboniferous. Missouri. Included in Lower Carboniferous.

Encrinital limestone, Broadhead. Mo. Geol. Surv., Rept., 1855–1871, pp. 43, 71. 1873.

Carboniferous. Missouri. Included in Lower Carboniferous. Exact syn. Burlington limestone.

Encrinital limestone, Meek. Mo. Geol. Surv., Repts., 1855–1871, pp. 140, 173. 1873.

Carboniferous. Missouri. Included in Lower Carboniferous.

Encrinital limestone, Broadhead. Mo. Geol. Surv., Repts., 1873–74, pp. 25, 67, 183. 1874.

Carboniferous. Missouri. Included in Lower Carboniferous, Mountain limestone. Exact syn. Burlington.

Encrinital limestone, Broadhead. Mo. Geol. Surv., Repts., 1873–74, pp. 25, 67. 1874.

Lower Carboniferous. Missouri. Exact syn. Burlington limestone.

English River gritstones, Bain. Am. Geol., vol. xv, p. 322. 1895.

Carboniferous. Iowa. Included in Mississippian series, Kinderhook.

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Carboniferous. Iowa. Included in Kinderhook.

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Cambrian. Vermont. Exact syns. Granular limestone, Berkshire limestone, Stockbridge limestone, Dorset limestone.

Eolian limestone, Hitchcock. Geol. of Vermont, vol. i, pp. 394–395, 419–424. 1861.

Cambrian. Vermont. Exact syns. Berkshire limestone, Stockbridge limestone.

Eolian limestone, Hitchcock. Geol. of Maine, Prelim. Rept., vol. ii, pp. 245–259. 1862.

Cambrian. Maine. Exact syn. Stockbridge limestone.

Eolian limestone, Crosby. Rept. on Geol. Map of Mass., p. 40. 1876.

Pre-Cambrian.

Eolian limestone, Dana. Am. Jour. Sci., 3d ser., vol. xiii, p. 414. 1877.

Silurian. Vermont. Part. syns. Lower Calciferous, Quebec, Chazy, Black River, Trenton.

Eolian limestone, Hitchcock. Geol. Soc. Am., Bull., vol. i, p. 513. 1889.

Ordovician(?). Vermont.

Eolian, Walcott. Geol. Soc. Am., Bull., vol. ii, p. 502. 1891.

Ordovician(?). Quebec. Included in Quebec group.

Eo-Lignitic, Heilprin. Phil. Acad. Nat. Sci., Proc., 1882, p. 184. 1882.
Included in Eocene.

Eo-Lignitic, Heilprin. Phil. Acad. Nat. Sci., Jour., vol. ix, p. 116. 1884.
Included in Tertiary-Eocene. Exact syns. Marlborough and Piscataway beds of Maryland(?). Shark River deposits of New Jersey.

Equus beds, Cope. U. S. Geol. and Geog. Surv. of Terr., Mon., vol. iii, pp. 19–20. 1881.
Tertiary. Included in Pliocene.

Equus beds, Dumble. Jour. of Geol., vol. ii, pp. 563–564. 1894.
Pleistocene. Texas.

Equus beds, Scott. Geol. Soc. Am., Bull., vol. v, p. 594. 1894.
Pleistocene. Nebraska.

Equus beds, Dall. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, p. 336. 1898.
Pleistocene.

Erian, Clarke and Schuchert. Science, new ser., vol. x, pp. 876–877. 1899.
Devonian. New York. Includes Marcellus shale, Hamilton beds.

Erie division, Vanuxem. Geol. of New York, pt. iii, pp. 170–171. 1842.
Paleozoic. New York. Included in New York system.

Erie division, Mather. Geol. of New York, pt. i, pp. 317–323. 1843.
Paleozoic. New York. Included in New York system. Includes Ithaca and Chemung group, Hamilton group, Marcellus shales, 3d graywacke, No. viii, Olive shale, Skaneateles shale, Ludlowville shale, Encrinal limestone, Moscow shale, Apulia and Sherburne shales, Cazenovia group.

Erie, Emmons. Agriculture of New York, vol. i, pp. 180–186. 1846.
Devonian. New York. Included in New York system. Includes Marcellus, Hamilton.

Erie clay, Logan. Can. Geol. Surv., Repts., 1843–1863, pp. 887, 896–907. 1863.
Canada. Included in Drift (upper stratified portion).

Erie clays, Newberry. Ohio Geol. Surv., Rept. Prog., 1869, p. 26. 1870.
Carboniferous. Ohio.

Erie shale, Newberry. Ohio Geol. Surv., Rept. Prog., 1869, p. 20. 1870.
Devonian. Ohio.

Erie shale, Newberry. Ohio Geol. Surv. Rept. Prog., 1869, p. 27. 1870.
Devonian. Ohio. Part. syn. Chemung group of New York.

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Erie clays, Newberry. Lyceum of New York, Annals, vol. ix, pp. 222–225. 1870.
Pleistocene. Great Lakes region. Included in Drift deposit.

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Devonian. Ohio.

Erie shale, Newberry. Ohio Geol. Surv., vol. i, pt. i, pp. 163, 190. 1873.
Devonian. Ohio.

Erie shale, Read. Ohio Geol. Surv., vol. i, p. 486. 1873.
Devonian. Ohio.

Erie clay, Gilbert. Ohio Geol. Surv., vol. i, pt. i, p. 544. 1873.
Pleistocene. Ohio.

Erie clay, Newberry. Ohio Geol. Surv., vol. i, pt. i, p. 174. 1873.
Pleistocene. Ohio.

Erie muck, Collett. Ind. Geol. Surv., 5th Ann. Rept., for 1873, p. 408. 1874.
Indiana.

Erie shale, Newberry. Ohio Geol. Surv., vol. ii, pp. 188, 213. 1874.
Carboniferous. Ohio.

Erie shale, Winchell. Ohio Geol. Surv., vol. ii, pp. 242, 264. 1874.
Carboniferous. Ohio.

Erie shale, Lesley. 2d Pa. *Geol. Surv., Rept.* I, pp. 76–82. 1875.
Silurian. *Pennsylvania and Ohio.* Exact. syn. No. vii.

Erie clay, Newberry. Ohio Geol. Surv., vol. iii, p. 32. 1878.
Pleistocene. Ohio.

Erie shale, Read. Ohio Geol. Surv., vol. iii, p. 306. 1878.
Carboniferous. Ohio.

Erie, Newberry. Ohio Geol. Surv., vol. iii, p. 18. 1878.
Carboniferous. Ohio.

Erie shale, Herrick. Denison Univ. Sci. Lab., Bull., vol. iv, p. 106. 1888.
Devonian. Ohio.

Erie shale, Orton. Ohio Geol. Surv., vol. vi, pp. 4, 23. 1888.
Devonian. Ohio. Included in Ohio shale.

Erie shale, Orton. Ohio Geol. Surv., vol. vii, pp. 4, 21. 1893.
Devonian. Ohio. Included in Ohio shale.

Erie limestone, Haworth. Kan. Univ. Quart., vol. ii, pp. 118–119. 1894.
Carboniferous. Kansas.

Erie limestone, Haworth and Piatt. Kan. Univ. Quart., vol. ii, p. 116. 1894.
Carboniferous. Kansas. Exact syn. Altoona limestone.

Erie limestone, Haworth and Kirk. Kan. Univ. Quart., vol. ii, pp. 108–109. 1894.
Carboniferous. Kansas.

Erie limestone, Haworth. Am. Jour. Sci., 3d ser., vol. i, p. 458. 1895.
Carboniferous. Kansas. Included in Coal Measures.

Erie limestone, Kirk. Kan. Univ. Geol. Surv., vol. i, p. 76. 1896.
Carboniferous. Kansas.

Erie limestone, Haworth. Kan. Univ. Geol. Surv., vol. i, pp. 45–47. 1896.
Carboniferous. Kansas.

Erie limestone, Haworth. Kan. Univ. Geol. Surv., vol. i, pp. 154–157, 165. 1896.
Carboniferous. Kansas. Includes Bethany Falls limestone.

Erie limestone, Bennett. Kan. Univ. Geol. Surv., vol. i, pp. 95–97. 1896.
Carboniferous. Kansas.

Erie limestone, Haworth. Kan. Univ. Geol. Surv., vol. iii, pp. 44–47, 88, 94, 101–102. 1898.
Carboniferous. Kansas. Included in Pottawatomie formation. Includes Bethany Falls rock and the Winterset limestone.

Erie limestone, Orton. Geol. Soc. Am., Bull., vol. x, p. 104. 1899.
Upper Carboniferous. Kansas.

Eryops beds, Cope. U. S. Geol. and Geog. Surv. of Terr., Bull., vol. v, p. 51–52. 1879.
Carboniferous. Included in Permian.

Escondido, Dumble. Geol. Soc. Am., Bull., vol. iii, pp. 219, 227. 1892.
Cretaceous. Texas. Included in Upper Cretaceous, Eagle Pass division.

Escondido beds, Vaughan. U. S. Geol. Surv., Bull. No. 164, p. 26. 1900.
Cretaceous. Texas. Included in Eagle Pass formation.

Esmeralda formation, Turner. U. S. Geol. Surv., 21st Ann. Rept., pt. ii, pp. 191–224. 1900. Am. Geol., vol. xxv, pp. 168–170. 1900.
Tertiary. Nevada.

Esopus slate, Darton. N. Y. State Geol., 13th Ann. Rept., pp. 209–210, 244–245, 302. 1894.
Devonian. New York. Exact syn. Cauda-galli grit.

Esopus slate, Darton. Regents, Univ. of N. Y., 47th Ann. Rept., p. 403. 1894.
Devonian. New York. Exact syn. Cauda-galli grit.

Esopus slate, Ries. N. Y. State Geol., 15th Ann. Rept., vol. i, p. 402. 1897.
Silurian. New York.

Esopus grit, Clarke and Schuchert. Science, new ser., vol. x, pp. 876–877. 1899.
Devonian. New York. Included in Ulsterian.

Esopus grit, Weller. N. J. Geol. Surv., Rept. 1899, p. 44. 1900.
Devonian. New Jersey.

Estuary formation, Engelmann. Eng. Dept., U. S. A., Simpson's Explor. of Great Basin, p. 291. 1876.
Cretaceous or Tertiary. Wyoming and Utah.

Etcheminian series, Matthew. Am. Geol., vol. ii, p. 1. 1888.
Cambrian. Canada.

Etcheminian, Walcott. Geol. Soc. Am., Bull., vol. x, p. 232. 1899.
Algonkian (?). New Brunswick.

Etcheminian series, Matthew. Can. Rec. Sci., vol. iii, p. 72. 1889.
Cambrian. New Brunswick.

Etcheminian, Walcott. Wash. Acad. Sci., Proc., vol. i, p. 338. 1900.
Cambrian. Newfoundland.

Etholen bed, Taff. Texas Geol. Surv., 2d Ann. Rept., pp. 723–725. 1891.
Cretaceous. Texas. Included in Washita division.

Eureka quartzite, Hague. U. S. Geol. Surv., 3d Ann. Rept., pp. 253, 262. 1883.
Silurian. Nevada.

Eureka shale, Simonds. Ark. Geol. Surv., 1888, vol. iv, pp. 26, 27. 1888.
Devonian (?). Arkansas.

Eureka shale, Hopkins. Am. Assoc. Adv. Sci., Proc., vol. xl, p. 256. 1891.
Devonian (?). Arkansas.

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Devonian (?). Arkansas.

Eureka quartzite, Hague. U. S. Geol. Surv., Mon., vol., xx, p. 54. 1892.
Silurian. Nevada.

Eureka fire clay, Wheeler. Mo. Geol. Surv., Sheet Rept. No. ii, p. 59. 1893.
Upper Carboniferous. Missouri. Included in Lower Coal Measures.

Eureka shale, Drake. Am. Phil. Soc., Proc., vol. xxxvi, p. 347. 1897.
Carboniferous. Indian Territory. Included in Lower Carboniferous.

Eureka limestone, Haworth. Kan. Univ. Geol. Surv., vol. iii, pp. 67, 73. 1898.
Carboniferous. Kansas. Exact syn. Burlingame limestone of Wabaunsee formation.

Eureka shale, Williams. Am. Jour. Sci., 4th ser., vol. viii, pp. 139–149. 1898.
Carboniferous. Arkansas. Part. syn. Kinderhook.

Eureka shale, Shepard. Mo. Geol. Surv., vol. xii, pp. 67–71. 1898.
Devonian. Missouri. Included in Hamilton stage.

Eureka limestone, Tower and Smith. U. S. Geol. Surv., 19th Ann. Rept., pt. iii, pp. 622–624. 1899.
Carboniferous. Utah.

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Cambro-Silurian. Maryland. Includes Chazy and Calciferous. Exact syns. Valley or Shenandoah limestone, Auroral.

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Silurian. Virginia. Includes Hudson River, Utica, and Trenton. Exact. syn. Matinal of Pennsylvania.

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Silurian. Virginia. Exact syn. Medina, Levant of Pennsylvania.

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Silurian. Virginia. Included in Upper Silurian. Includes Clinton, Niagara, and Salina. Part. syn. Surgent and Scalent of Pennsylvania.

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Silurian. Virginia. Exact syn. Lower Helderberg pre-Meridian of Pennsylvania.

Formation No. 7, Rogers. Rept. for 1837 and Geol. of Virginias, p. 179. 1884.
Silurian. Virginia. Exact syns. Oriskany, Meridian of Pennsylvania.

Formation No. 8, Rogers. Rept. for 1837 and Geol. of Virginias, p. 179. 1884. 1837.
Devonian. Virginia. Includes Marcellus, Hamilton, Genesee, Portage, and Chemung. Part. syns. Cadent and Vergent of Pennsylvania.

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Devonian. Virginia. Exact syns. Catskill, Ponent of Pennsylvania.

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Carboniferous. Virginia. Included in Lower Carboniferous. Exact syn. Vespertine sandstone of Pennsylvania.

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Formation No. 14, Rogers. Rept. for 1840 and Geol. of Virginias, pp. 491, 510. 1884.
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Maryland.

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Silurian. Maryland. Exact syns. Levant series of Pennsylvania; Onedia conglomerate and Medina sandstone of New York.

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Silurian. Maryland. Exact syns. Surgent series of Pennsylvania, Clinton group of New York.

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Silurian. Maryland. Exact syns. Scalent series of Pennsylvania; Onondaga shale and Water-lime groups of New York.

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Devonian. Maryland. Exact syns. Vergent series of Pennsylvania; Portage, Ithaca, and Chemung groups of New York.

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Devonian. Maryland. Exact syns. Ponent series of Pennsylvania; Catskill group of New York.

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Devonian. Maryland. Exact syn. Vespertine series of Pennsylvania.

Formation No. 18b, Tyson. Md. State Agric. Chemist, 1st Rept., p. 40. 1860.
Carboniferous. Maryland. Exact syn. Umbral series of Pennsylvania.

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Carboniferous. Maryland. Exact syn. Seral series of Pennsylvania.

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Juratrias. Maryland

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Cretaceous. Maryland.

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Upper Cretaceous. Kansas. Included in Niobrara.

Fort Hays limestone, Logan. Kan. Univ. Geol. Surv., vol. ii, pp. 219–220. 1897.
Upper Cretaceous. Kansas. Included in Niobrara group.

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Upper Cretaceous. Kansas. Included in Niobrara.

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Cretaceous. Kansas, Nebraska. Included in Niobrara. Exact syn. Lower Timpas beds.

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Exact syn. Fort Knox sandstone, No. 2.

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Lower Carboniferous. Alabama, Tennessee.

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Carboniferous. Alabama. Included in Sub-Carboniferous or Mississippian.

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Lower Carboniferous. Alabama and Georgia.

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Carboniferous. Alabama. Part. syn. Siliceous group.

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Upper Cretaceous. Nebraska. Exact syn. Cretaceous No. 4.

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Cretaceous. Included in Upper Cretaceous. Exact syn. Cretaceous No. 4.

Fort Pierre, Hayden. U. S. Geol. Surv. of Terr., 1st–3d Ann. Repts., pp. 49, 55. 1873.
Cretaceous. Exact syn. Cretaceous No. 4.

Fort Pierre group, Meek. U. S. Geol. and Geog. Surv. of Terr., Mon., vol. ix, pp. xxxiii–xxxv. 1876.
Cretaceous.

Fort Pierre, Hague. U. S. Explor. of 40th Parallel, vol. ii, pp. 42. 1877.
Cretaceous. Colorado. Included in Colorado formation.

Fort Pierre, White. U. S. Geol. and Geog. Surv. of Terr., 11th Ann. Rept., p. 187. 1879.
Cretaceous.

Fort Pierre group, Newton. Geol. of Black Hills, pp. 172–173. 1880.
Cretaceous. South Dakota.

Fort Pierre, Stevenson. U. S. Geog. and Geol. Surv. W. of 100th M., vol. iii, Suppl., p. 99. 1881.
Cretaceous. Colorado, New Mexico. Included in Colorado formation. Exact syn. Cretaceous No. 4.

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Cretaceous. Colorado and New Mexico.

Fort Pierre shale, Upham. U. S. Geol. Surv., Mon., vol. xxv, p. 86. 1895.
Cretaceous. Minnesota.

Fort Pierre group, Logan. Kan. Univ. Geol. Surv., vol. ii, pp. 221–222. 1897.
Upper Cretaceous. Kansas. Exact syn. Pierre.

Fort Riley limestone, Prosser. Geol. Soc. Am., Bull., vol. vi, pp. 30, 48, 52. 1894.
Permian. Kansas.

Fort Riley limestone, Haworth. Kan. Univ. Geol. Surv., vol. i, p. 190. 1896.
Carboniferous. Kansas. Included in Chase formation, Permian. Exact syn. Florence limestone.

Fort St. John shales, Dawson. Can. Geol. Surv., Rept. 1879–80, p. 115B. 1881.
Cretaceous. British Columbia. Included in Colorado group. Exact syn. Lower dark shales. Part. syn. Benton.

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Cretaceous. Canada. Exact syn. Benton.

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Cretaceous. Canada. Included in Colorado group. Includes Fort St. John *shales*.

Fort Scott limestone, Swallow. Kan. Geol. Surv., Prelim. Rept., pp. 25-26. 1866.
Carboniferous. Kansas.

Fort Scott group, Broadhead. Mo. Geol. Surv., Rept. 1873-74, pp. 101, 126, 158. 1874.
Carboniferous. Missouri. Included in Coal Measures.

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Carboniferous. Missouri.

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Tertiary. Included in Eocene(?).

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Tertiary. Exact syn. Great Lignite.

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Cretaceous.

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Cretaceous.

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Cretaceous.

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Cretaceous(?).

Fort Union, Peale. U. S. Geol. and Geog. Surv. of Terr., 8th Ann. Rept., p. 141. 1876.
Tertiary. Colorado. Exact syn. Great Lignite group.

Fort Union group, White. Am. Jour. Sci., 3d ser., vol. xxvi, pp. 120-123. 1883.
Cretaceous. Montana. Included in Laramie group.

Fort Union, Ward. U. S. Geol. Surv., 6th Ann. Rept., p. 438. 1885.
Cretaceous, Tertiary. Rocky Mountains. Exact syn. Laramie.

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Cretaceous. Interior region.

Fort Union, Weed. U. S. Geol. Surv., Bull., No. 106, p. 35. 1893.
Tertiary. Montana.

Fort Union, Weed. Am. Geol., vol. xviii, pp. 201-211. 1896.
Tertiary. Montana. Included in Eocene. Exact syn. Paskapoo (Canada).

Fort Union formation, Smith. Jour. of Geol., vol. viii, pp. 445-448. 1900.
Tertiary. Western North America. Included in Eocene.

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Cretaceous. Texas. Included in Washita division of Comanche series. Exact syn. Washita limestone.

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Cretaceous. Texas. Included in Washita division.
Fort Worth limestone, Taff. Texas Geol. Surv., 3d Ann. Rept., pp. 345–347. 1892.
Cretaceous. Texas. Included in Washita division of Lower Cretaceous.
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Cretaceous. Texas. Included in Washita division of Lower Cretaceous.
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Cretaceous. Texas. Included in Washita division.
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Cretaceous. Texas. Included in Comanche series.
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Cretaceous. Texas. Included in Washita division of Comanche series.
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Cretaceous. Texas. Included in Comanche series.
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Alaska.
Fortymile series, Emmons. Nat. Geog. Mag., vol. ix, pp. 156, 157. 1898.
Alaska.
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Silurian. New Jersey. Exact syn. Trenton limestone.
Fountain, Cross. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 7. 1894.
Carboniferous. Colorado.
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Carboniferous. Colorado.
Fountain formation, Gilbert. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 36. 1897.
Juratrias. Colorado.
Fountain beds series, Crosby. Geol. Soc. Am., Bull., vol. x, p. 43. 1899.
Carboniferous. Colorado.
Fourth Moraine, Todd. U. S. Geol. Surv., Bull., No. 144, p. 48. 1896.
Pleistocene. Dakota.
Fox Ford bed, Drake. Texas Geol. Surv., 4th Ann. Rept., p. 378. 1883.
Carboniferous. Texas. Included in Strawn division.
Fox Hills beds, Meek and Hayden. Phil. Acad. Nat. Sci., Proc., vol. xiii, pp. 419, 427. 1862.
Upper Cretaceous. Nebraska. Exact syn. Cretaceous No. 5.
Fox Hills, Hayden. U. S. Geol. Surv. of Wyoming, Rept., pp. 87, 91. 1871.
Cretaceous. Included in Upper Cretaceous. Exact syn. Cretaceous No. 5.
Fox Hill, Hayden. U. S. Geol. Surv. of Terr., 1st–3d Ann. Repts., p. 49. 1873.
Cretaceous. Exact syn. Cretaceous No. 5.
Fox Hills group, Meek. U. S. Geol. and Geog. Surv. of Terr., Mon., vol. ix, pp. xxxv–xxxvii. 1876.
Cretaceous.
Fox Hill, Hague, U. S. Geol, Explor. of 40th Parallel, vol. ii, p. 28. 1877.
Cretaceous. Colorado.
Fox Hills, Endlich. U. S. Geol. and Geog. Surv. of Terr., 9th Ann. Rept., p. 187. 1877.
Cretaceous. Colorado.
Fox Hill group, King. U. S. Geol. Explor. of 40th Parallel, vol. i, p. 320–330. 1878.
Cretaceous. Colorado, Wyoming and Utah.
Fox Hills, Endlich. U. S. Geol. and Geog. Surv. of Terr., 10th Ann. Rept., pp. 76, *109, 125. 1878.*

Cretaceous. Colorado.

Fox Hills, White. U. S. Geol. and Geog. Surv. of Terr., 10th Ann. Rept., pp. 19, 22, 31. 1878. Cretaceous. Utah and Colorado.

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Cretaceous. Colorado.

Fox Hills, White. U. S. Geol. and Geog. Surv. of Terr., 11th Ann. Rept., pp. 187. 1879.
Cretaceous.

Fox Hills, Endlich. U. S. Geol. and Geog. Surv. of Terr., 11th Ann. Rept., pp. 85, 87, 109, 123. 1879.
Cretaceous. Wyoming.

Fox Hills group, Newton. Geol. of the Black Hills, pp. 171–172. 1880.
Cretaceous. South Dakota.

Fox Hills, Dawson. Science, vol. i, p. 429. 1883.
Cretaceous. Canada.

Fox Hills group, Dutton. U. S. Geol. Surv., 6th Ann. Rept., pp. 136–140. 1885.
Cretaceous. Northwestern New Mexico. Includes Upper and Lower Fox Hills shales.

Fox Hills group, Tyrrell. Can. Geol. Surv., new ser., vol. ii, pp. 129–131. 1887.
Cretaceous. Canada.

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Cretaceous. Colorado and New Mexico.

Fox Hills, Emmons, Cross, and Eldridge. U. S. Geol. Surv., Mon., vol. xxvii, p. 71. 1896.
Cretaceous. Colorado. Included in Montana group.

Fox Hills group, Gilbert. U. S. Geol. Surv., 17th Ann. Rept., pt. ii, p. 567. 1896.
Cretaceous. Colorado.

Fragmental, Bain. Am. Jour. Sci., 4th ser., vol. v, pp. 438, 439. 1898.
Carboniferous. Missouri. Included in Missourian series, Bethany limestone.

Franciscan series, Lawson. Am. Geol., vol. xv, p. 347. 1895.
Cretaceous(?). California.

Franciscan series, Lawson. U. S. Geol. Surv., 15th Ann. Rept., p. 415. 1895.
Mesozoic. California. Includes San Francisco sandstone, Foraminiferal limestones and Radiolarian cherts.

Franciscan formation, Turner. Jour. of Geol., vol. vi, pp. 488–493. 1898.
Cretaceous. California. Exact syn. Golden Gate series.

Franciscan, Willis. Geol. Soc. Am., Bull., vol. xi, p. 420. 1900.
Cretaceous or Jurassic. California.

Franconia breccia, Huntington. Geol. of New Hamp., pt. ii, pp. 137–141. 1877.
Eozoic. New Hampshire. Included in Montalban group.

Frankenfield, Hill. Harvard Coll. Mus. Comp. Zool., Bull., vol. xxxiv, p. 42. 1899.
Cretaceous. Jamaica. Included in Blue Mountains series.

Frankford gneiss, Rand. Phil. Acad. Nat. Sci., Proc., 1900, p. 279. 1900.
Pennsylvania.

Frankfort slate, Vanuxem. N. Y. Geol. Surv., 4th Ann. Rept., pp. 372–373. 1840.
New York.

Frankfort slate, Vanuxem. Geol. of N. Y., pt. iii, pp. 61–64. 1842.
Paleozoic. New York. Included in Hudson River group.

Frankfort slate, White. N. Y. State Mus., 51st Ann. Rept., vol. i, p. 33. 1899.
Silurian. New York. Includes Utica and Hudson River.

Franklin white limestone, Wolff and Brooks. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, pp. 431–456. 1898.
Pre-Cambrian. New Jersey.

Fredericksburg, Roger Bros. Phil. Acad. Nat. Sci., Proc., vol. i, p. 142. 1843.

Virginia. Exact syn. Oolite of Europe.

Fredericksburg, White. Phil. Acad. Nat. Sci., Proc., 1887, p. 40. 1887.

Cretaceous. Texas. Included in Comanche series.

Fredericksburg division, Hill. Ark. Geol. Surv., 1888, vol. ii, pp. 111–113. 1888.

Cretaceous. Arkansas. Included in Lower Cretaceous or Comanche series.

Fredericksburg division, Dumble. Texas Geol. Surv., 1st Ann. Rept., pl. iii, p. li, 1890.

Cretaceous. Texas. Included in Comanche series.

Fredericksburg division, Hill. Texas Geol. Surv., 1st Ann. Rept., pp. 120–126. 1890.

Cretaceous. Texas. Included in Comanche series. Includes Caprina chalk and limestone, Comanche Peak beds.

Fredericksburg division, Taff. Texas Geol. Surv., 2d Ann. Rept., p. 717. 1891.

Cretaceous. Texas. Included in Lower Cretaceous. Includes Texana bed, Caprotina limestone.

Fredericksburg division, Hill. Geol. Soc. Am., Bull., vol. ii, pp. 503, 504, 509. 1891.

Cretaceous. Texas. Includes Goodland limestone, Caprina limestone, Comanche Peak chalk, Gryphæa and Walnut clays, and Paluxy sands.

Fredericksburg division, Taff. Texas Geol. Surv., 3d Ann. Rept., pp. 273–275. 1892.

Cretaceous. Texas. Includes Kiamitia clay, Austin marble, Flag limestone, Caprina limestone, Comanche Peak, and Texana.

Fredericksburg division, Taff. Texas Geol. Surv., 4th Ann. Rept., pp. 245–261. 1893.

Cretaceous. Texas. Included in Lower Cretaceous. Includes Kiamitia clay, Caprina, Comanche Peak, and Texana limestone.

Fredericksburg, Dumble and Cummins. Am. Geol., vol. xii, p. 311. 1893.

Cretaceous. Texas.

Fredericktown limestone, Keyes. Mo. Geol. Surv., Sheet Rept. No. iv, p. 18. 1896.

Cambrian. Missouri. Included in Upper Cambrian.

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Cambrian. Missouri. Included in Upper Cambrian.

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Cambrian. Missouri.

Freeport group, Rogers. Geol. of Pa., vol. ii, pp. 492, 501, 576. 1858.

Carboniferous. Pennsylvania. Included in Coal Measures.

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Carboniferous. Pennsylvania.

Freeport group, Lesley. 2d Pa. Geol. Surv., Rept. Q, p. xvi. 1878.

Carboniferous. Pennsylvania.

Freeport, Platt. 2d Pa. Geol. Surv., Rept. H^5, p. 315. 1880.

Carboniferous. Pennsylvania.

Freeport group, Chance. 2d Pa. Geol. Surv., Rept. V^2, pp. 33–41. 1880.

Carboniferous. Pennsylvania. Included in Lower Productive Measures.

Freeport sandstone, Orton. Ohio Geol. Surv., vol. v, pp. 21, 22. 1884.

Carboniferous. Ohio. Includes Upper and Lower Freeport sandstone.

Freeport, White. 2d Pa. Geol. Surv., Rept. T^3, pp. 53–54. 1885.

Carboniferous. Pennsylvania.

Freeport, Ashburner. 2d Pa. Geol. Surv., Rept. R^2, p. 384. 1885.

Carboniferous. Pennsylvania.

Freeport coal, White. U. S. Geol. Surv., Bull., No. 65, p. 147. 1891.

Carboniferous. Ohio, Pennsylvania, West Virginia. Included in Lower Coal Measures, Allegheny River series. Includes Upper, Middle, and Lower Freeport.

Freeport limestone, Upper, White. U. S. Geol. Surv., Bull., No. 65, p. 159. 1891.

Carboniferous. Ohio, Pennsylvania, and West Virginia. Included in Lower Coal Measures, Allegheny River series. Exact syns. Shawnee, White, Buchtel, Summit ore.

Freeport limestone, Lower, White. U. S. Geol. Surv., Bull., No. 65, p. 163. 1891.

Carboniferous. Ohio, Pennsylvania. Included in Lower Coal Measures, Allegheny River series. Exact syn. Buff limestone of Ohio.

Freeport sandstone, Upper, White. U. S. Geol. Surv., Bull., No. 65, p. 160. 1891.

Carboniferous. Pennsylvania, and West Virginia. Included in Lower Coal Measures, Allegheny River series.

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Carboniferous. Pennsylvania, Ohio and West Virginia. Included in Lower Coal Measures, Allegheny River series.

Freeport sandstone, White. Geol. Soc. Am., Bull., vol. iii, p. 187. 1892.

Upper Carboniferous. West Virginia. Included in Lower Coal Measures.

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Carboniferous. Ohio.

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Carboniferous. Ohio.

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Pleistocene. Wisconsin.

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Pleistocene. Illinois.

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Carboniferous. Pennsylvania. Included in Allegheny series.

Fremont limestone, Walcott. Geol. Soc. Am., Bull., vol. iii, pp. 153, 157, 170. 1892.

Ordovician. Colorado.

Fremont limestone, Cross. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 7. 1894.

Silurian. Colorado.

Frickham bed, Drake. Texas Geol. Surv., 4th Ann. Rept., p. 403. 1893.

Carboniferous. Texas. Included in Cisco division.

Frio clays, Dumble. Jour. of Geol., vol. ii, pp. 554-555. 1894.

Tertiary. Texas. Included in Eocene.

Frio clays, Kennedy. Phil. Acad. Nat. Sci., Proc., 1895, p. 93. 1895.

Texas. Included in Eocene, Lower Claiborne.

Frog Mountain sandstone, Hayes. Geol. Soc. Am., Bull., vol. v, p. 470. 1894.

Lower Devonian. Georgia and Alabama. Included in Oriskany (?).

Frostburg coal formation, Tyson. Md. Acad. of Sci. and Lit., article iv, pp. 92-98. 1837.

Carboniferous. Maryland.

Frostburg formation, Clark. Md. Geol. Surv., vol. i, pp. 156, 188. 1897.

Carboniferous. Maryland. Included in Permian.

Frostburg, Clark. Md. Geol. Surv., vol. ii, p. 170. 1898.

Permian. Maryland.

Fullington shale, Cragin. Am. Geol., vol. xvi, p. 379. 1895.

Cretaceous. Kansas. Included in Belvidere beds. Includes Black Hill shale, Blue Cut shale.

Fusulina limestone, Worthen. Ill. Geol. Surv., vol. vii, p. 27. 1883.

Carboniferous. Illinois. Included in Coal Measures.

Gale sands, Willis and Smith. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 54. 1899.

Pleistocene. Washington.

Galena limestone, Whitney. Iowa Geol. Surv., vol. i, pt. i, pp. 288–290, 298–302, 350–356. 1858.
Silurian. Iowa.

Galena limestone, Hall. Iowa Geol. Surv., vol. i, pp. 60–63. 1858.
Silurian. Iowa. Exact syn. Upper Magnesian limestone.

Galena limestone, Hall and Whitney. Am. Jour. Sci., 2d ser., vol. xxvii, p. 108. 1859.
Silurian. Iowa.

Galena limestone, Whitney. Rept. on Upper Mississippi lead region, p. 168. 1862.
Silurian. Wisconsin. Exact syn. Upper Magnesian or Cliff limestone.

Galena limestone, Worthen. Ill. Geol. Surv., vol. i, pp. 141–149. 1866.
Silurian. Illinois. Included in Trenton group.

Galena limestone, Whitney. Ill. Geol. Surv., vol. i, pp. 169–172. 1866.
Silurian. Illinois.

Galena limestone, White. Iowa Geol. Surv., vol. i, pp. 177–180. 1870.
Silurian. Iowa. Included in Trenton group.

Galena limestone, Winchell. Minn. Geol. and Nat. Hist. Surv., 4th Ann. Rept., pp. 49–53. 1870.
Lower Silurian, Minnesota.

Galena limestone, Winchell. Minn. Geol. and Nat. Hist. Surv., 1st Ann. Rept., pp. 104–108. 1873.
Lower Silurian. Minnesota.

Galena limestone, Shaw. Ill. Geol. Surv., vol. v, pp. 17–21, 36–38, 66–69, 76–77, 86–88, 99–100, 111–113, 129–131, 154–155. 1873.
Silurian. Illinois. Included in Trenton.

Galena group, Broadhead. Mo. Geol. Surv., Rept. 1873–74, p. 28. 1874.
Lower Silurian. Missouri.

Galena limestone, Harrington. Minn. Geol. and Nat. Hist. surv., 4th Ann. Rept., p. 91. 1876.
Lower Silurian. Minnesota.

Galena limestone, Chamberlin. Geol. of Wis., vol. ii, p. 305–314. 1877.
Lower Silurian. Wisconsin.

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Silurian. Wisconsin. Included in Trenton period.

Galena limestone, Winchell. Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. i, p. 293. 1884.

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Silurian. Arkansas.

Galena limestone, McGee. U. S. Geol. Surv., 11th Ann. Rept., pt. i, p. 327. 1891.
Silurian. Iowa.

Galena, Hall and Sardeson. Geol. Soc. Am., Bull., vol. iii, p. 368. 1892.
Lower Silurian. Minnesota. Included in Trenton.

Galena limestone, Keyes. Iowa Geol. Surv., vol. i, pp. 26–28. 1893.
Silurian. Iowa.

Galena, Winchell. Am. Geol., vol. xv, p. 33. 1895.
Silurian. Mississippi Valley.

Galena limestone, Calvin. Iowa Geol. Surv., vol. iv, pp. 80–81. 1895.
Silurian. Iowa. Included in Ordovician.

Galena-Trenton, Norton. Iowa Geol. Surv., vol. iii, pp. 178–180. 1895.
Silurian. Iowa.

Galena limestone, *Udden.* U. S. Geol. Surv., 17th Ann. Rept., pt. ii, p. 835. 1896.
Silurian. Illinois.

Galena, Sardeson. Am. Geol., vol. xviii, pp. 356–368. 1896.
Silurian. Minnesota, Wisconsin, and Iowa. Exact syn. Trenton.

Galena limestone, Winchell and Ulrich. Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iii, pt. ii, p. xcvii. 1897.
Lower Silurian. Minnesota. Included in Trenton group.

Galena formation, Sardeson. Am. Geol., vol. xix, pp. 24, 29–30, 330–336. 1897.
Silurian. Mississippi Valley. Included in Lower Silurian. Includes Maclurea, Lingulelasma, Camerella, and Orthisina beds.

Galena limestone, Galvin and Bain. Iowa Geol. Surv., vol. x, p. 423. 1900.
Silurian. Iowa. Included in Ordovician.

Galisteo sandstone, Cope. Rept. of Secy. of War to 44th Cong., vol. ii, pt. ii, p. 997. 1875.
Cretaceous(?). New Mexico.

Galisteo group, Stevenson. Am. Jour. Sci., 3d ser., vol. xviii, pp. 471–475. 1879.
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Devonian. New York.

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Devonian. New York. Includes Ludlowville shale, Encrinal limestone, Moscow shale.

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Devonian. New York.

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Silurian. Virginia, Tennessee.

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Silurian. Massachusetts.

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Cambrian. Maryland.

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Silurian. Tennessee.

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Carboniferous. Indiana.

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Lower Carboniferous. Indiana.

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Carboniferous. Indiana.

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Carboniferous. Indiana.

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Carboniferous. Kansas.

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Carboniferous. Alabama. Included in Upper Subcarboniferous.

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Carboniferous. Indian Territory.

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Carboniferous. Arkansas. Included in Sebastian stage.

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Tertiary. Alabama. Included in Eocene.

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Silurian. Massachusetts.

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Cambrian(?). Massachusetts. Part. syn. Stockbridge limestone.

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Silurian. Massachusetts.

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Tennessee, North Carolina. Included in Ocoee group.

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Cretaceous. New Jersey. Included in Matawan formation.

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Devonian. New York.

Helderberg limestone series. Mather. N. Y. Geol. Surv., 5th Ann. Rept., pp. 85–89. 1841.
Devonian. New York. Includes Seneca, Corniferous and Onondaga limestones, Oriskany, Scutella limestone, Delthyris shale, and Pentamerus limestone.

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New York.

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Includes Middle Silurian.

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Paleozoic. New York. Included in New York system. Includes Corniferous limestone = Seneca limestone, Selenurus limestone, Onondaga limestone = Gray sparry limestone, Schoharie grit, Cauda-galli grit = Cocktail grit of Dr. Eight, Oriskany sandstone = White sandstone 1838, No. vii, Pa. Rept., Delthyris shaly limestone = Scutella limestone, sparry limestone of Gebhard, Delthyris shales, Catskill shaly limestone, Pentamerus limestone = No. vi, Pennsylvania Survey, Water limestone = Tentaculite limestone, and Hydraulic limerock of Eaton.

Helderberg division. Emmons. Agric. of N. Y., vol. i, pp. 153–179. 1846.
New York. Includes Onondaga salt group; Manlius water lime and shales; Pentamerus, Delthyris, and Encrinal limestones; Oriskany sandstone; Cauda-galli Schoharie grits; and Onondaga limestone.

Helderberg series, Upper. Hall. Foster and Whitney's Rept. on Geol. of Lake Superior Dist., pt. ii, p. 183. 1851.
Devonian. Lake Superior region.

Helderberg series, Upper. Hall. Am. Jour. Sci., 2d ser., vol. xvii, pp. 193–194. 1854.
Devonian. Michigan.

Helderberg, Upper. Meek. Mo. Geol. Surv., 1st and 2d Ann. Repts., pt. ii, p. 103. 1855.
Devonian. Missouri.

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Devonian. Iowa.

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Silurian. New York.

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Devonian. Vermont.

Helderberg group, Lower, Logan. Can. Geol. Surv., Rept., 1843–1864, pp. 345–352. 1863.
Upper Silurian. Canada. Includes Water-lime group; Pentamerous limestone; Delthyris shaly limestone; Encrinal limestone; and Upper Pentamerous limestone.

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Silurian. Canada. Included in Upper Silurian.

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Silurian. New York.

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Silurian. New Jersey.

Helderberg limestone, Lower, Worthen. Ill. Geol. Surv., vol. iii, pp. 25–26, 36–37. 1868.
Silurian. Illinois.

Helderberg, Lower, Safford. Geol. of Tennessee, pp. 322–328. 1869.
Silurian. Tennessee. Exact syn. Lower Helderberg of New York.

Helderberg, Lower, Worthen. Am. Assoc. Adv. Sci., Proc., vol. xix, p. 175. 1870.
Silurian. Illinois.

Helderberg series, Dana. Am. Jour. Sci., 3d ser., vol. vi, pp. 339–352. 1873.
Silurian. Massachusetts, Connecticut.

Helderberg, Newberry. Ohio Geol. Surv., vol. i, pt. i, pp. 63, 104. 1873.
Silurian. Ohio.

Helderberg group, Lower, Hall. Am. Assoc. Adv. Sci., Proc., vol. xxii, p. 321. 1873.
Silurian. New York, Mississippi Valley. Includes Upper Pentamerus and shaly limestone, Lower Pentamerus and Tentaculite limestone.

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Silurian. Tennessee. Included in Lower Helderberg period.

Helderberg strata, Hitchcock. Am. Jour. Sci., 3d ser., vol. vii, pp. 476, 557–568. 1874.
Silurian. New Hampshire.

Helderberg, Orton. Ohio Geol. Surv., vol. ii, pp. 615, 643. 1874.
Silurian. Ohio. Included in Upper Silurian. Includes Water lime.

Helderberg, Lower, Hall. Regents Univ. of N. Y., 27th Ann. Rept., pp. 117–131. 1875.
Silurian. New York. Includes Tentaculite limestone, Lower Pentamerus limestone, shaly limestone, Upper Pentamerus or Scutella, and Limestone formation no. vi (Pa.).

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Upper Silurian. Virginia. Exact syns. Pre-Meridian. (Formation vi, Rogers.)

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Silurian. New York.

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Silurian. Massachusetts, Vermont.

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Devonian. New Hampshire.

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Silurian. Appalachian region. Includes Lewistown (Pre-Meridian) limestone.

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Upper Silurian. Wisconsin.

Helderberg, Upper, Ashburner. Am. Phil. Soc. Proc., vol. xvi, pp. 529, 553. 1877.
Devonian. Appalachian region. Exact syns. Post-Meridian, Corniferous.

Helderberg, Lower, Hussey. Ohio Geol. Surv., vol. iii, p. 445. 1878.
Silurian. Ohio. Exact syn. Water lime.

Helderberg, Lower, Orton. Ohio Geol. Surv., vol. iii, p. 600. 1878.
Silurian. Ohio. Exact syn. Water lime.

Helderberg, Upper, Hall. Albany Inst., Trans., vol. ix, pp. 169–175. 1879.
Devonion. Ohio.

Helderberg, Lower, Stevenson. Am. Phil. Soc., Proc., vol. xix, p. 98. 1880.
Silurian. Virginia.

Helderberg, Lower, Platt. 2d Pa. Geol. Surv., Rept. T., pp. 37–41. 1881.
Silurian. Pennsylvania. Exact syn. Lewiston limestone.

Helderberg group, Lower, Miller. Cin. Soc. Nat. Hist., Jour., vol. iv, no. iv, pp. 274, 292. 1881.

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Devonian. Pennsylvania.

Helderberg group, Upper, Miller. Cin. Soc. Nat. Hist., Jour., vol. iv, no. iv, p. 291. 1881.

Helderberg limestone, Lower, Englemann and Worthen. Econ. Geol. of Ill., vol. i, pp. 463–464. 1882.
Silurian. Illinois. Exact. syn. Niagara of Northern Illinois.

Helderberg, Lower, Stevenson. 2d Pa. Geol. Surv., Rept. T^2, pp. 87–89. 1882.
Silurian. Pennsylvania.

Helderberg, Lower, White. 2d Pa. Geol. Surv., Rept. G^6, pp. 127–147. 1882.
Silurian. Pennsylvania. Includes Stormville shales, Decker Ferry limestone, Bossardville limestone, and Poxono Island shales. Exact syn. No. vi.

Helderberg, Upper, White. 2d Pa. Geol. Surv., Rept. G^6, pp. 116–122. 1882.
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Silurian. Wisconsin. Included in Upper Silurian. Includes Oriskany, Lower Helderberg, and Salina.

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Silurian. Wisconsin. Included in Upper Silurian.

Helderberg, Lower, Hall. Am. Assoc. Adv. Sci., Proc., vol. xxxi, p. 48. 1883.
Silurian. New York.

Helderberg, Lower, White. 2d Pa. Geol. Surv., Rept. G^7, pp. 87–110. 1883.
Silurian. Pennsylvania. Includes Stormville, Bastard, and Bossardville limestones, Salina series. Exact syn. No. vi.

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Upper Silurian. Wisconsin.

Helderberg, Lower, Claypole. 2d Pa. Geol. Surv., Rept. F^2, pp. 58–62. 1885.
Silurian. Pennsylvania. Includes Lewistown (Bossardville) limestone.

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Silurian. New York.

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Silurian. New York.

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Silurian. New York.

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Devonian. New York.

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Devonian. New York.

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Silurian. Ohio, Indiana. Includes Water lime, and Cliff limestone.

Helderberg, limestone, Upper, Orton. U. S. Geol. Surv., 8th Ann. Rept., pt. ii, p. 568. 1889.
Devonian. Ohio, Indiana. Exact syn. Corniferous.

Helderberg group, Lower, Miller. N. A. Geol. and Pal., p. 56. 1889.

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Helderberg formation, Lower, Orton. Ohio Geol. Surv., 3d Organization, 1st Ann. Rept., pp. 21-23. 1890.
Silurian. Ohio. Exact syn. Water-lime formation.

Helderberg, Lower, Hopkins. Ark. Geol. Surv., 1890, vol. iv, p. 52. 1890.
Silurian. Arkansas. Includes Pentamerus, Catskill, Encrinal, and Upper Pentamerus limestones. Part syn. Water-lime group.

Helderberg limestone, Upper, Orton. Ohio Geol. Surv., 3d Organization, 1st Ann. Rept., pp. 24-26. 1890.
Devonian. Ohio. Includes Columbus and Delaware limestones.

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Silurian. Indiana.

Helderberg, Lower, D'Invilliers. 2d Pa. Geol. Surv., Rept. F^4, pp. 54-61. 1891.
Silurian. Pennsylvania. Includes Lewistown limestone. Exact syn. No. vi.

Helderberg, Upper, Phinney. U. S. Geol. Surv., 11th Ann. Rept., pt. i, p. 635. 1891.
Devonian. Indiana.

Helderberg, Lower, Prosser. Roch. Acad. Sci., Proc., vol. ii, pp. 50-124. 1892.
Silurian. New York.

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Devonian. New York.

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Silurian. New York.

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Devonian. New York. Includes Upper shaly beds, Scutella, Pentamerus, and Tentaculite beds.

Helderberg, Upper, Prosser. U. S. Geol. Surv., Bull. No. 120, p. 78. 1894.
Devonian. New York, Pennsylvania. Included in Corniferous (Lower Devonian.)

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Devonian. New York. Includes Onondaga, Corniferous, Seneca.

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Devonian. New York. Includes Onondaga and Corniferous limestones.

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Silurian. New York.

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Silurian. New York.

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Silurian. New York.

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Devonian. Maryland. Part. syns. Lewistown.

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Silurian. Indian Territory.

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Devonian. New York. Includes Coeymans limestone, New Scotland beds, Becraft limestone, Kingston beds.

Helderberg, Schuchert. Geol. Soc. Am., Bull., vol. xi, pp. 269–278. 1900.
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Algonkian, Pre-Cambrian. Montana. Included in Belt terrane.

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Cambrian. Pennsylvania.

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Michigan. Included in Lower Huronian series.

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Algonkian. Michigan. Includes Bone Lake schists.

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Michigan.

Hemlock formation, Van Hise. U. S. Geol. Surv., 19th Ann. Rept., pt. iii, p. 16. 1899.
Algonkian. Michigan. Included in Lower Huronian.

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Carboniferous. Kansas.

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Upper Carboniferous. Missouri. Included in Des Moines series.

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Upper Carboniferous. Missouri. Exact syn. Appanoose. Part. syns. Pawnee and Oswego of Kansas.

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Carboniferous. Mississippi Valley. Included in Coal Measures.

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Cretaceous. Utah.

Henrys Fork group, Peale. U. S. Geol. and Geog. Surv. of Terr., 9th Ann. Rept., p. 89. 1877.
Cretaceous. Colorado. Included in Dakota.

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Cambrian and Silurian. Michigan.

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Carboniferous. Colorado.

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Cambrian. Tennessee and North Carolina.

Hickman group (?), Loughridge. Ky. Geol. Surv., Jackson Purchase Region, pp. 37-41. 1888.
. Eocene. Kentucky.

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Tertiary. Kentucky. Included in Eocene.

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Cambrian. Texas. Included in Lower Cambrian(?).

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Cambrian. Texas.

Hickory, Walcott. U. S. Geol. Surv., Bull. No. 81, p. 246. 1891.
Cambrian. Texas.

Hickory series, Comstock. Texas Geol. Surv., 2d Ann. Rept., p. 564. 1891.
Cambrian. Texas. Included in Lower Cambrian.

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Included in Eocene. Colorado.

High Rock sandstone, Ashley. Indiana Dept. Geol. and Nat. Resources, 23d Ann. Rept., 1898, p. 113. 1899.
Carboniferous. Indiana.

Highbridge limestone, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 46. 1898.
Silurian. Kentucky.

Highland moraine, Elftman. Am. Geol., vol. xxi, pp. 92-93. 1898.
Pleistocene. Minnesota.

Highland Archean, Britton. Sch. of Mines Quart., vol. ix, pp. 33-37. 1887.
New Jersey. Includes Gneissic and Schistose group, Iron-bearing group, and Massive group. Part. syn. Laurentian.

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Silurian. Ohio. Included in Niagara series.

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Ohio. Included in Niagara series.

Hillsboro sandstone, Orton. Ohio Geol. Surv., vol. vi, pp. 4, 13. 1888.
Upper Silurian. Ohio. Included in Niagara group.

Hillsboro sandstone, Orton. Ohio Geol. Surv., 3d Organization, 1st Ann. Rept., p. 20. 1890.
Silurian. Ohio. Included in Niagara group.

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Upper Silurian. Ohio. Included in Niagara group.

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Jurassic. California. Included in Corallian-Jurassic.

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Jurassic. California. Included in Corallian.

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Minnesota.

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Cambrian. Iowa. Included in St. Croix sandstone.

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Cambrian. Minnesota.

Hindostan whetstone, Kindle. Indiana Dept. Geol. and Nat. Resources, 20th Ann. Rept., 1895, p. 336. 1896.
Indiana.

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Pre-Cambrian. Massachusetts.

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Hinton, Dumble. Texas Geol. Surv., 1st Ann. Rept., pl. iii. 1890.

Silurian. Texas. Included in San Saba series.

Hinton division, Comstock. Texas Geol. Surv., 1st Ann. Rept., pp. 302–303. 1890.

Silurian. Texas. Included in San Saba series.

Hinton formation, Campbell and Mendenhall. U. S. Geol. Surv., 17th Ann. Rept., pt. ii, p. 487. 1896.

Carboniferous. West Virginia. Exact syns. Greenbrier shale, No. xi of Rogers.

Hinton, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 26. 1896.

Carboniferous. Virginia, West Virginia.

Hinton formation, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 44. 1897.

Carboniferous. Virginia and West Virginia. Part syns. No. xi, Greenbrier shale.

Hog Creek bed, Drake. Texas Geol. Surv., 4th Ann. Rept., p. 397. 1893.

Carboniferous. Texas. Included in Canyon division.

Hogback sandstone, Middle, Powell. U. S. Geog. and Geol. Surv., Geol. of Uinta Mountains., pp. 40, 48, 155. 1876.

Cretaceous. Utah. Included in Point of Rocks.

Hogback sandstone, Upper, Powell. U. S. Geog. and Geol. Surv., Geol. of Uinta Mountains, pp. 40, 48, 155. 1876.

Cretaceous. Utah. Included in Point of Rocks.

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Cretaceous. Alaska.

Holland sandstone, Orton. Ohio Geol. Surv., 3d Organization, 1st Ann. Rept., p. 24. 1890.

Silurian. Ohio. Exact syns. Monclova sandstone, Sylvania sandstone.

Holocene, Perry. Boston Soc. Nat. Hist., Proc., vol. xv, 1872–73, p. 55. 1872.

New England. Included in Tertiary.

Holyoke formation, Wadsworth. Mich. Geol. Surv., Rept. State Board for 1891, 1892, pp. 63, 64, 66, 84, 127. 1893.

Azoic or Archean. Michigan. Exact syn. Upper Marquette series. Part. syn. Taconic formation in Michigan.

Holyoke, Van Hise. Geol. Soc. Am., Bull., vol. v, p. 6. 1893.

Archean. Michigan. Included in Marquette.

Home Creek bed, Drake. Texas Geol. Surv., 4th Ann. Rept. pp. 398–399. 1893.

Carboniferous. Texas. Included in Canyon division.

Homewood sandstone, Platt. 2d Pa. Geol. Surv., Rept. H^5, p. 324. 1880.

Carboniferous. Pennsylvania. Included in Pottsville conglomerate.

Homewood sandstone, White. U. S. Geol. Surv., Bull. No. 65, p. 199. 1891.

Carboniferous. Ohio, Pennsylvania, West Virginia. Included in Pottsville conglomerate series.

Homewood sandstone, Orton. Ohio Geol. Surv., vol. vii, p. 36. 1893.
Carboniferous. Ohio. Included in conglomerate group.

Honaker limestone, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 44. 1897.
Cambrian. Virginia and West Virginia.

Honaker limestone, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 59. 1899.
Cambrian. Virginia and Tennessee.

Honesdale sandstone, White. 2d Pa. Geol. Surv., Rept. G^5, pp. 66–68. 1881.
Devonian. Pennsylvania. Included in Catskill.

Honesdale sandstone, White. 2d Pa. Geol. Surv., Rept. G^6, pp. 97–98. 1882.
Devonian. Pennsylvania. Included in Catskill.

Honesdale sandstone, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, p. 1580. 1892.
Devonian. Pennsylvania. Included in Catskill, No. ix.

Honesdale sandstone, Prosser. U. S. Geol. Surv., Bull. No. 120, p. 78. 1894.
Devonian. New York, Pennsylvania. Included in Catskill (Upper Devonian).

Hoosac schist, Emerson. U. S. Geol. Surv., Geol. Atlas of U. S., Hawley sheet. 1892.
Silurian or Cambrian. Massachusetts. Part. syn. Stockbridge limestone, upper part.

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Siluro-Cambrian. Massachusetts.

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Cambrian (?). Massachusetts. Part. syn. Stockbridge limestone.

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Silurian. Massachusetts.

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Silurian. Massachusetts. Included in Lower Silurian.

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Silurian. Massachusetts.

Hoover division, Comstock. Texas Geol. Surv., 1st Ann. Rept., pp. 298–301. 1890.
Silurian. Texas.

Hop Brook limestone, Emerson. U. S. Geol. Surv., Bull. No. 159, p. 52. 1899.
Pre-Cambrian. Massachusetts.

Hopewell sandstone, Ami. Can. Rec. Sci., vol. viii, p. 162. 1900.
Carboniferous. Canada.

Hordes Creek bed, Drake. Texas Geol. Surv., 4th Ann. Rept., p. 422. 1893.
Carboniferous. Texas. Included in Albany division.

Horse Creek clay and shales, Drake. Texas Geol. Surv., 4th Ann. Rept., p. 379. 1893.
Carboniferous. Texas. Included in Strawn division.

Horse Creek bed, Drake. Texas Geol. Surv., 4th Ann. Rept., p. 419. 1893.
Carboniferous. Texas. Included in Cisco division.

Horsepen group, White. Geol. Soc. Am., Bull., vol. vi, p. 316. 1895.
Upper Carboniferous. West Virginia. Included in Pottsville formation.

Horsetown, Becker. U. S. Geol. Surv., Bull. No. 19, p. 20. 1885.
California.

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Cretaceous. California.

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Cretaceous. California.

Horsetown beds, Diller and Stanton. Geol. Soc. Am., Bull., vol. v, pp. 435, 445. 1894.

Cretaceous.

Hosmer conglomerate, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, pp. 1508–1509. 1892.

Devonian. Pennsylvania. Included in Venango.

Hosselkus limestone, Diller. Geol. Soc. Am., Bull., vol. iii, p. 372. 1892.

Trias. California. Included in Lower Karnic.

Hosselkus limestone, Smith. Jour. of Geol., vol. ii, pp. 606–609. 1894.

Trias. California. Included in Cedar formation.

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Pleistocene. Yellowstone Park.

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Carboniferous. Kansas. Exact syn. Topeka limestone.

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Silurian. New York.

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Silurian. New York. Includes Frankfort slate and Mohawk slate.

Hudson River group, Vanuxem. Geol. of N. Y., pt. iii, pp. 60–67. 1842.

Paleozoic. New York. Included in New York system. Includes Frankfort slate, Green slate, Pulaski shale, Graywacke of Eaton, and No. iii, Pa. Survey.

Hudson River group, Hall. Geol. of N. Y., pt. iv, 4th Geol. Dist., pp. 18, 30. 1843.

Paleozoic. New York. Included in New York system. Exact syn. Blue limestone of Ohio.

Hudson River group, Mather. Geol. of N. Y., pt. i, pp. 369–389. 1843.

Paleozoic. New York. Included in Champlain division. Includes Frankfort slate, Graywacke, Pulaski shale, and No. iii, Pa. Survey.

Hudson River group, Hall. Foster and Whitney's Rept. on Lake Superior Dist., pt. ii, p. 148. 1851.

Silurian. Lake Superior region.

Hudson River, Swallow. Mo. Geol. Surv., 1st and 2d Ann. Repts., p. 110. 1855.

Silurian. Missouri. Included in Lower Silurian.

Hudson River group, Hall. Iowa Geol. Surv., vol. i, p. 64. 1858.

Silurian. Iowa.

Hudson River group, Whitney. Iowa Geol. Surv., vol. i, pp. 290, 299, 356. 1858.

Silurian. Iowa.

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Silurian. Iowa.

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Silurian. Iowa.

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Paleozoic. Vermont. Included in Hudson period.

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Silurian. Wisconsin.

Hudson River formation, Logan. Can. Geol. Surv., Rept. 1843–1863, pp. 198–224. 1863.

Lower Silurian. Canada.

Hudson River formation, Chapman. Can. Inst., new ser., vol. viii, pp. 205–208. 1863.

Silurian. Canada. Included in Lower Silurian, Ontario group.

Hudson River formation, Bell. Can. Geol. Surv., Rept. 1863–1866, pp. 171–173, 1866. Can. Geol. Surv., Rept. 1866–1869, pp. 125–127, 1871.
Silurian. Canada.

Hudson River group, Meek. Am. Jour. Sci., 2d ser., vol. xviii, p. 256. 1867.
Silurian. Illinois, New York.

Hudson River slate, Cook. Geol. of N. J., pp. 135–145. 1868.
Silurian. New Jersey.

Hudson River group, Shumard. Mo. Geol. Surv., Repts. 1855–1871, pp. 264, 297. 1873.
Silurian. Missouri. Includes Upper Hudson shale, Cape Girardeau sandstone, Lower Hudson shale, and Receptaculite limestone.

Hudson shale, Upper, Shumard. Mo. Geol. Surv., Repts. 1855–1871, p. 264. 1873.
Silurian. Missouri. Included in Hudson River group.

Hudson shale, Lower, Shumard. Mo. Geol. Surv., Repts. 1855–1871, p. 265. 1873.
Silurian. Missouri. Included in Hudson River group.

Hudson group, Newberry. Ohio Geol. Surv., vol. i, pt. i, p. 60. 1873.
Silurian. Ohio.

Hudson, Hotchkiss. A Geographical and Political Summary of Virginia, p. 22. 1876.
Cambrian and Lower Silurian. Virginia. Exact syns. Matinal. (Formation iii, Rogers.)

Hudson River, Prime. Am. Phil. Soc., Proc., vol. xvi, p. 254. 1877.
Silurian. Pennsylvania. Exact. syns. Matinal, No. iii in part.

Hudson River, Ashburner. Am. Phil. Soc., Proc., vol. xvi, pp. 532, 558. 1877.
Silurian. Appalachian region. Part. syn. Matinal in part.

Hudson River slates, Prime. Am. Jour. Sci., 3d ser., vol. xv, p. 269. 1878.
Silurian. Pennsylvania. Exact syn. Matinal slates.

Hudson River, Hall. Am. Assoc. Adv. Sci., Proc., vol. xxvi, pp. 259–265. 1878.
Silurian. New York, Pennsylvania, and Ohio valley. Exact syn. Cincinnati.

Hudson River slate, Prime. 2d Pa. Geol. Surv., Rept. D^2, pp. 71–74. 1878.
Silurian. Pennsylvania. Included in No. iii.

Hudson River, Dana. Am. Jour. Sci., 3d ser., vol. xvii, p. 375. 1879.
Silurian. New York.

Hudson River group, Miller. Cin. Soc. Nat. Hist., Jour., vol. iv, pp. 267, 269, 285. 1881.
Ordovician.

Hudson River, Platt. 2d Pa. Geol. Surv., Rept. T, pp. 48–51. 1881.
Silurian. Pennsylvania.

Hudson Tribolite beds, Wooster. Geol. of Wisconsin, vol. iv, p. 110. 1882.
Cambrian. Wisconsin. Included in Potsdam sandstone.

Hudson, Stevenson. 2d Pa. Geol. Surv., Rept. T^2, pp. 92–93. 1882.
Silurian. Pennsylvania.

Hudson River group, Linney. Ky. Geol. Surv., Geol. of Garrard Co., pp. 15–19. 1883.
Silurian. Kentucky. Includes Lower, Middle, and Upper.

Hudson River formation, Chamberlin. Geol. of Wis., vol. i, pp. 170–175. 1883.
Lower Silurian or Cambro-Silurian. Wisconsin. Exact syn. Cincinnati.

Hudson River, Hall. Am. Assoc. Adv. Sci., Proc., vol. xxxi, p. 41. 1883.
Silurian.

Hudson River, Winchell. Minn. Geol. and Nat. Hist., Surv., Final Rept., vol. i, p. 360. 1884.

Hudson beds, Upper, Linney. Ky. Geol. Surv. (Proctor), Geol. of Clark and Montgomery Counties. 1884.
Silurian or Cambrian. Kentucky. Included in Hudson River period.

Hudson beds, Lower, Linney. Ky. Geol. Surv. (Proctor), Geol. of Clark and Montgomery Counties. 1884.
Silurian or Cambrian. Kentucky. Included in Hudson River period.

Hudson River group, Linney. Ky. Geol. Surv., Geol. of Spencer and Nelson Counties, pp. 8–18, 30–36. 1884.
Silurian. Kentucky. Includes Lower, Middle, and Upper.

Hudson River, Knott. Ky. Geol. Surv., Rept. on Marion Co., p. 12. 1885.
Silurian. Kentucky. Includes Middle and Upper beds.

Hudson beds, Linney. Ky. Geol. Surv., Geol. of Mason Co., pp. 7–13. 1886.
Silurian. Kentucky. Includes Lower, Middle, and Upper.

Hudson, Linney. Ky. Geol. Surv., Geol. of Bath Co., pp. 10–16. 1886.
Silurian. Kentucky. Includes Lower, Middle, and Upper Hudson.

Hudson River group, Miller. N. A. Geol. and Pa., p. 45. 1899.

Hudson terrane, Walcott. Geol. Soc. Am., Bull., vol. i, p. 353. 1889.
Silurian. New York. Includes Hudson River shale, Utica shale, Frankfort shale, Lorraine shale, Salmon River, Cincinnati shale, Nashville shale, and Maquoketa shale.

Hudson River group, Walcott. Geol. Soc. Am., Bull, vol. i, p. 344. 1889.
Silurian. New York. Exact syns. Salmon River, Hudson River, Lorraine, Nashville, Cincinnati, and Maquoketa.

Hudson River limestone, Hopkins. Ark. Geol. Surv., 1890, vol. iv, p. 51. 1890.
Silurian. Arkansas.

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Carboniferous. Illinois.

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Carboniferous. Illinois.

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Carboniferous. Mississippi Valley.

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Archean. New Brunswick.

Kingston group, Matthew. Can. Geol. Surv., Rept., 1876–77, pp. 336–338. 1878.

Silurian. New Brunswick. Included in Upper Silurian.

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Carboniferous. Pennsylvania.

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Carboniferous. Pennsylvania. Included in Lower Productive Measures. Includes Johnstown cement limestones.

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Carboniferous. Ohio, Pennsylvania, West Virginia. Included in Lower Coal Measures, Allegheny River series.

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Carboniferous. Ohio.

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Kittitas, Russell. U. S. Geol. Surv., Bull. No. 108, p. 20. 1893. U. S. Geol. Surv., 20th Ann. Rept., pt. ii, p. 118 (footnote). 1900.

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Alaska.

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Carboniferous. Indiana.

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Indiana. Exact syn. Ohio Waverly sandstone.

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Indiana.

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Carboniferous. Indiana.

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Carboniferous. *Kentucky. Included in* Subcarboniferous.

Knobstone beds, Lyon. St. Louis Acad. Sci., Trans., vol. i, p. 619. 1857.

Subcarboniferous. Kentucky.

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Indiana.

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Indiana. Exact syns. Chemung group (Iowa), Waverly group (Ohio), and Kinderhook group (Illinois).

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Silurian. Pennsylvania. Included in Lower Helderberg.

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Silurian. Virginia. Part syn. Lower Helderberg.

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Silurian. Maryland. Part syns. Niagara, Lower Helderberg.

Lewistown formation, Clark. Md. Geol. Surv., vol. i, p. 182. 1897.
Silurian. Maryland. Includes Niagara, Salina, and Lower Helderberg.

Lewistown, Clark. Md. Geol. Surv., vol. ii, p. 170. 1898.
Silurian and Devonian. Maryland.

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Silurian. Virginia and West Virginia.

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Silurian. Kentucky.

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Silurian. Massachusetts.

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Eocene. Mississippi.

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Tertiary. Wyoming and Colorado.

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Eocene. Mississippi, Alabama, Georgia, Texas, Arkansas. Exact syns. Buhrstone group, Siliceous Claiborne. Part syns. Lagrange and Porter's Creek groups, Flatwoods clay.

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Eocene (?). Rocky Mountain region.

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Tertiary. British Columbia.

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Western Territories.

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Tertiary, Cretaceous. Colorado.

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Cretaceous (?). Colorado.

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Tertiary. Colorado.

Lignite, Cope. U. S. Geol. and Geog. Surv. of Terr., 1873, p. 432. 1874.
Tertiary. Colorado. Exact syn. Fort Union.

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Tertiary. Colorado. Included in Eocene.

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Tertiary. Includes Lower Lignitic, Upper or Great Lignitic.

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Cretaceous and Tertiary.

Lignite, Hayden. U. S. Geol. and Geog. Surv. of Terr., 8th Ann. Rept., p. 19. 1876.
Tertiary. Rocky Mountains. Includes Fort Union, Wind River, White River, Loup Fork, and Monument Creek groups.

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Cretaceous or Eocene. Wyoming.

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Tertiary. Included in Eocene.

Lignitic, Lesquereux. U. S. Geol. and Geog. Surv. of Terr., 8th Ann. Rept., p. 275. 1876.
Tertiary.

Lignite group, Dawson. Can. Geol. Surv., Rept. 1875–76, pp. 255–260. 1877.
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Silurian. Missouri. Included in Lower Silurian.

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Silurian. Missouri. Included in Lower Silurian.

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Silurian. Missouri. Included in Lower Silurian.

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Silurian. Missouri. Included in Lower Silurian.

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Lower Carboniferous. West Virginia.
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Mauch Chunk red shale, Hopkins. Penn. State Coll. Ann. Rept. for 1896, Appendix, pp. 91–105. 1897.
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Silurian. Wisconsin. Included in Niagara.

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Cretaceous. Kansas. Includes Reeder sandstone, Kirby clays, Greenleaf sandstone, and Spring Creek clays.

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Silurian. Canada. Included in Middle Silurian. Niagara group.

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Silurian. New Jersey.

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Silurian. Ohio.

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Medina, Newberry. Ohio Geol. Surv., vol. iii, p. 4. 1878.
Silurian. Ohio. Included in Upper Silurian.

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Silurian. Pennsylvania. Included in No. iv.

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Silurian. Includes Medina sandstone, Oneida conglomerate, and Gray sandstone.

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Silurian. Kentucky. Included in Niagara period.

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Silurian. Pennsylvania. Includes Oneida conglomerate. Exact syn. No. iv.

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Silurian. Pennsylvania.

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Silurian. Virginia.

Medina, White. 2d Pa. Geol. Surv., Rept. T^3, pp. 143–147. 1885.
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Silurian. New York.

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Algonkian. Vermont.

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Cambrian. Wisconsin. Included in Potsdam.

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Algonkian. Michigan.

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Algonkian. Michigan. Includes Vulcan iron formation, Antoine dolomite, and Sturgeon quartzite.

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Cretaceous. Kansas. Included in Comanche series.

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Lower Cretaceous. Kansas. Included in Comanche series.

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Carboniferous. Ohio. Exact syn. Gore limestone.

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Carboniferous. Ohio. Included in Conglomerate group.

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Cretaceous. Colorado.

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New Red, Lyman. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. ii, pp. 2589–2638. 1895.

Juratrias. Pennsylvania, New Jersey. Includes Pottstown, Perkasie, Lansdale, Gwynedd, and Norristown shales. Exact syn. Newark.

New Red, Hopkins. Pa. State Coll. Ann. Rept. for 1896, Appendix, p. 45, et seq. 1897.

Juratrias. Pennsylvania.

New Richmond sandstone, Winchell. Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. ii, pp. xxii and 11, 37, 73, 388. 1888.

Cambrian. Included in Lower Magnesian.

New Richmond sandstone, Keyes. Iowa Geol. Surv., 1st Ann. Rept., vol. i, p. 23. 1893.

Silurian. Iowa. Included in Lower Silurian, Lower Magnesian limestone, and St. Peter sandstone.

New Richmond sandstone, Hall and Sardeson. Geol. Soc. Am., Bull., vol. vi, pp. 167, 179. 1895.

Upper Cambrian. Wisconsin. Included in Magnesian series. Includes Elevator B.

New River system, Fontaine. Am. Jour. Sci., 3d ser., vol. vii, p. 463. 1874.

New River system, Platt. 2d Pa. Geol. Surv., Rept. 4^2, pp. xxiv–xxvi. 1877.

New River coal group, Lesley. 2d Pa. Geol. Surv., Rept 4^3, p. xxiii. 1877.

New River coal group, White. U. S. Geol. Surv., Bull., No. 65, p. 202. 1891.

Carboniferous. Ohio, Pennsylvania, and West Virginia. Included in Pottsville conglomerate series. Includes Sharon coal, Fire Creek and Quinnemont beds.

New River coal series, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. i, p. 1665. 1895.

Carboniferous. Pennsylvania. Included in No. x, Pocono formation. Exact syn. No. xc.

New River coal series, White. W. Va. Geol. Surv., vol. i, p. 202. 1899.

Carboniferous. West Virginia.

New Scotland beds, Clarke and Schuchert. Science, new ser., vol. x, pp. 876–877. 1899.

Devonian. New York. Included in Helderbergian.

New Scotland beds, Weller. N. J. Geol. Surv., Rept., 1899, p. 32. 1900.

Devonian. New Jersey.

New Ulm quartzite, Winchell. Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. ii, p. xxii. 1888.

Minnesota.

New York transition system, Emmons. Geol. of New York, part ii, pp. 99–127. 1842.

Paleozoic. New York. Includes Champlain, Ontario, Helderberg, and Erie groups.

New York system, Vanuxem. Geol. of N. Y., pt. iii, pp. 11–16, 24–194. 1842.

Paleozoic. New York. Includes all subdivisions from Potsdam to Catskill, *inclusive*.

New York system, Hall. Geol. of N. Y., part iv, 4th Geol. Dist., pp. 18 et seq., 500–515, 516–520. 1843.
Paleozoic. New York. Includes all subdivisions from Potsdam to Chemung, inclusive. Twenty-eight subdivisions in all.

New York system, Emmons. Agric. of N. Y., vol. i, pp. 113–199. 1846.
Silurian. New York. Includes Champlain, Ontario, Helderberg, and Erie divisions.

New York system, Williams. U. S. Geol. Surv., Bull. No. 80, p. 59. 1891.
Paleozoic. New York.

Newark, Redfield. Am. Jour. Sci., 2d ser., vol. xxii, p. 357; Am. Assoc. Adv. Sci., Proc., vol. x, p. 181. 1856.

Newark, Darton. U. S. Geol. Surv., Bull. No. 67. 1890.
Juratrias. New Jersey.

Newark, Russell. U. S. Geol. Surv., Bull. No. 85, p. 16. 1892.
Juratrias.

Newark, Keith. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 10. 1894.
Juratrias. Virginia, Maryland, and West Virginia.

Newark system, Keith. U. S. Geol. Surv., 14th Ann. Rept., pt. ii, p. 345. 1894.
Juratrias. Maryland and Virginia.

Newark diabase, Keith. U. S. Geol. Surv., 14th Ann. Rept., pt. ii, p. 352. 1894.
Maryland and Virginia.

Newark, Lyman. Am. Phil. Soc., Proc., vol. xxxiii, pp. 5, 9. 1894.
Juratrias. Eastern United States.

Newark, Lyman. Jour. of Geol., vol. ii, pp. 59–61. 1894.
Juratrias.

Newark, Gilbert. Jour. of Geol., vol. ii, pp. 55–59. 1894.
Juratrias.

Newark, Davis and Griswold. Geol. Soc. Am., Bull., vol. v, p. 516. 1894.
Trias. Connecticut.

Newark, Hitchcock. Science, new ser., vol. i, pp. 74–77. 1895.
Juratrias, Triassic. Connecticut.

Newark, Russell. Science, new ser., vol. i, p. 266. 1895.
Juratrias. General.

Newark system, Kummel. N. J. Geol. Surv., Rept., 1896, pp. 25–88. 1897.
Juratrias. New Jersey. Includes Stockton, Lockatong, and Brunswick series.

Newark system, Kummel. Jour. of Geol., vol. v, pp. 541–562. 1897.
Juratrias. New Jersey. Includes Stockton series; Lockatong and Brunswick shale series.

Newark, Clark. Md. Geol. Surv., vol. i, p. 156. 1897.
Triassic. Maryland.

Newark system, Kummel. N. J. Geol. Surv., Rept., 1897, pp. 23–159. 1898.
Juratrias. New Jersey. Includes Stockton, Lockatong, and Brunswick series.

Newark, Clark. Md. Geol. Surv., vol. ii, p. 170. 1898.
Triassic. Maryland.

Newark, Kummel. Jour. of Geol., vol. vii, pp. 23–52. 1899.
Juratrias. New York, New Jersey.

Newark, Clark. Md. Geol. Surv., vol. iii, p. 91. 1899.
Triassic. Maryland.

Newark, Shaler and Woodworth. U. S. Geol. Surv., 19th Ann. Rept., pt. ii, pp. 396–418. 1899.
Juratrias. Virginia.

Newland limestone, Walcott. Geol. Soc. Am., Bull., vol. x, pp. 199, 206. 1899.
Algonkian, Pre-Cambrian. Montana. Included in Belt terrane.

Newland limestone, Weed. U. S. Geol. Surv., 20th Ann. Rpt., pt. iii, p. 282. 1900.
Algonkian. Montana. *Included in Belt terrane.*

Newman limestone, Campbell. U. S. Geol. Surv., Bull., No. 111, p. 88. 1893.
Carboniferous. Virginia. Included in Coal Measures.

Newman limestone, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 12. 1894.
Carboniferous. Kentucky, Virginia, and Tennessee.

Newman limestone, Keith. Wash. Phil. Soc., Bull., vol. xii, p. 74. 1895.
Carboniferous. Tennessee. Included in Lower Carboniferous.

Newman limestone, Keith. U. S. Geol. Surv., Geol. Atlas of U. S., Folios Nos. 16, 25, 27. 1895, 1896.
Carboniferous. Tennessee and North Carolina.

Newman limestone, Keith. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 33. 1896.
Carboniferous. Tennessee.

Newman limestone, Keith. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 40. 1897.
Carboniferous. Tennessee. Part. syn. Bangor limestone.

Newman limestone, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 47. 1898.
Carboniferous. Kentucky. Included in Mississippian series.

Newman limestone, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 46. 1898.
Carboniferous. Kentucky.

Newman limestone, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 53. 1899.
Carboniferous. Tennessee. Included in Mississippian series.

Newman limestone, U. S. Geol. Surv., Geol. Atlas of U. S. Folio No. 59. 1899.
Carboniferous. Virginia and Tennessee.

Newport conglomerate, Rogers. Boston Soc. Nat. Hist., Proc., vol. xviii, 1875-76, p. 97. 1875.

Newport limestone, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, p. 1594. 1892.
Devonian. Pennsylvania. Included in Catskill, No. ix.

Newport Neck shales, Shaler, Woodworth and Foerste. U. S. Geol. Surv., Mon., vol. xxxiii, p. 383. 1899.
Cambrian (?). Rhode Island.

Newtonville limestone, Andrews. Ohio Geol. Surv., Rept. Prog. 1869, p. 93. 1870.
Ohio. Exact syn. Maxville limestone.

Newtonville limestone, Andrews. Ohio Geol. Surv., Rept. Prog., 1869, p. 96. 1871.
Ohio. Exact syn. Maxville limestone.

Newtonville limestone, Andrews. Ohio Geol. Surv., vol. i, pt. i, p. 314. 1873.
Carboniferous. Ohio. Included in Coal Measures. Exact syn. Maxville limestone.

Newtonville limestone, Orton. Ohio Geol. Surv., vol. vi, pp. 3, 43. 1888.
Carboniferous. Ohio. Exact syn. Maxville limestone and Subcarboniferous limestone.

Niagara limestone, Hall. Am. Jour. Sci., 1st ser., vol. xlii, p. 58. 1842.

Niagara shale, Conrad. Phil. Acad. Nat. Sci., Jour., vol. viii, p. 232. 1842.
Middle Silurian.

Niagara sandstone, Conrad. Phil. Acad. Nat. Sci., Jour., vol. viii, p. 230. 1842.
Lower Silurian.

Niagara group, Vanuxem. Geol. of N. Y., pt. iii, pp. 90-94. 1842.
Paleozoic. New York. Included in New York system. Includes Lockport group, Upper part Proteau group, Geodiferous limerock, and Calciferous slate.

Niagara limestone, Rogers. Am. Phil. Soc., Trans., new ser., vol. viii, p. 274. *1842.*
Silurian. Canada and New York.

Niagara group, Hall. Geol. of N. Y., pt. iv, 4th Geol. Dist., pp. 18, 80–117. 1843.
Paleozoic. New York. Included in New York system. Includes Geodiferous limerock and Calciferous slate, Lockport limestone, Rochester shale, Niagara shale, and Niagara limestone. Part. syn. Proteau group, No. 6 of Pennsylvania Survey.

Niagara shale, Hall. Geol. of N. Y., pt. iv, 4th Geol. Dist., pp. 81–83. 1843.
Paleozoic. New York. Included in Niagara group.

Niagara limestone, Hall. Geol. of N. Y. pt. iv, 4th Geol. Dist., pp. 84–97. 1843.
Paleozoic. New York. Included in Niagara group.

Niagara group, Emmons. Agric. of N. Y., vol. i, pp. 150–152. 1846.
New York. Included in Ontario division of New York system. Includes Niagara shale and Niagara limestone. Exact syn. Geodiferous limerock and Calciferous slate, Lockport limestone and Rochester slate. Part. syn. Proteau group of Ann. Repts. of New York.

Niagara limestone, Emmons. Agric. of New York, vol. i, pp. 151–152. 1846.
New York. Included in Niagara group of Ontario division of New York system.

Nigara group, Loomis. Am. Jour. Sci., 2d ser., vol. i, p. 222. 1846.
Silurian. Tennessee.

Niagara limestone, Murray. Can. Geol. Surv., Rept., 1847–1848. 1849.
Silurian. Ontario.

Niagara group, Hale. Foster and Whitney's Rept. on Geol. of Lake Superior district, pt. ii, p. 156. 1851.
Silurian. Lake Superior region.

Niagara group, Hall. Pal. of New York, vol. ii, pp. 2–4, 106–108. 1852.
Silurian. New York.

Niagara group, Hall. Am. Jour. Sci., 2d ser., vol. xvii, p, 192. 1854.
Silurian. Michigan.

Niagara limestone, Hall. Iowa Geol. Surv., vol. i, p. 71. 1858.
Silurian. Iowa.

Niagara limestone, Whitney. Iowa Geol. Surv., vol. i, pt. i, pp. 292–295, 362–368. 1858.
Silurian. Iowa.

Niagara, Safford. Am. Jour. Sci., 2d ser., vol. xxxi, p. 207. 1861.
Silurian. Tennessee. Includes Variegated limestone, and glade-forming limestones and shales, or Gray limestones and shales.

Niagara limestone, Whitney. Rept. on Upper Mississippi lead region, p. 186. 1862.
Silurian. Wisconsin.

Niagara formation, Logan. Can. Geol. Surv., Rept. 1843–63, pp. 321–336. 1863.
Middle Silurian. Canada. Included in Anticosti group.

Niagara group, Chapman. Can. Inst., new ser., vol. viii, pp. 208–216. 1863.
Silurian. Canada. Included in Middle Silurian. Includes Medina and Clinton, Niagara and Guelph formations. Part. syn. Anticosti group (+ Guelph).

Niagara limestone, Worthen. Ill. Geol. Surv., vol. i, pp. 129–136. 1866.
Silurian. Illinois.

Niagara formation, Bell. Can. Geol. Surv., Rept. 1863–66, pp. 174, 176. 1866.
Middle Silurian. Canada.

Niagara formation, Bell. Rept. 1866–69, pp. 128–131. 1866, 1871.
Silurian. Canada.

Niagara limestone, Whitney. Ill. Geol. Surv., vol. i, pp. 177–186. 1866.
Silurian. Illinois. Exact syns. Upper Magnesian, Corraline and Pentamerus beds, and Mound limestone. Part. syn. Cliff limestone.

Niagara group, Bannister. Ill. Geol. Surv., vol. iii, pp. 245-253. 1868.
Silurian. Illinois.

Niagara limestone, Worthen. Ill. Geol. Surv., vol. iii, pp. 116-117. 1868.
Silurian. Illinois.

Niagara group, Safford. Geol. of Tennessee, by Safford, pp. 291-322. 1869.
Silurian. Tennessee. Includes Meniscus limestone, Dyestone group, White Oak Mount sandstone, and Clinch Mount sandstone. Exact syn. Dana's Niagara period. Part. syns. Medina, Clinton, and Niagara epochs.

Niagara group, Bannister. Ill. Geol. Surv., vol. iv, pp. 114, 131, 139. 1870.
Silurian. Illinois.

Niagara limestone, Bradley. Ill. Geol. Surv., vol. iv, pp. 213, 232. 1870.
Silurian. Illinois.

Niagara limestone, Worthen. Ill. Geol. Surv., vol. iv, p. 6. 1870.
Silurian. Illinois.

Niagara, Worthen. Am. Assoc. Adv. Sci., Proc., vol. xix, p. 172. 1870.
Silurian. Illinois.

Niagara group, White. Iowa Geol. Surv., vol. i, pp. 182-184. 1870.
Silurian. Iowa. Includes Niagara limestone. Part. syn. Le Claire limestone.

Niagara limestone, Hunt. Am. Jour. Sci., 3d ser., vol. i, pp. 420-424. 1871.
Silurian. Illinois.

Niagara, Hall. Am. Assoc. Adv. Sci., Proc., vol. xxii, p. 321. 1873.
Silurian. New York, Mississippi Valley. Exact syn. Coralline limestone.

Niagara, Newberry. Ohio Geol. Surv., vol. i, pt. i, pp. 62, 104, 128. 1873.
Silurian. Ohio.

Niagara, Orton. Ohio Geol. Surv., vol. i, pt. i, p. 464. 1873.
Silurian. Ohio.

Niagara, Winchell. Ohio Geol. Surv., vol. i, pt. i, pp. 596, 613, 627, 741. 1873.
Silurian. Ohio.

Niagara, Shumard. Mo. Geol. Surv., Rept., 1855-1871, pp. 261, 281, 296. 1873.
Silurian. Missouri. Included in Upper Silurian.

Niagara limestone, Worthen. Ill. Geol. Surv., vol. v, p. 223. 1873.
Silurian. Illinois.

Niagara limestone, Shaw. Ill. Geol. Surv., vol. v, pp. 15-16, 33-35, 64-65, 78-79, 132-134, 149-152, 187. 1873.
Silurian. Illinois.

Niagara, Orton. Ohio. Geol. Surv., vol. ii, p. 667. 1874.
Silurian. Ohio. Included in Upper Silurian. Includes Guelph or Cedarville beds, Springfield beds, West Union beds, Niagara beds, Niagara shale, and Dayton stone.

Niagara, Winchell. Ohio Geol. Surv., vol. ii, pp. 229, 316, 354, 359, 370, 398. 1874.
Silurian. Ohio.

Niagara limestone, Killebrew and Safford. Resources of Tenn., pp. 38-39. 1874.
Silurian. Tennessee. Included in Niagara period.

Niagara, Hall. Regents Univ. of N. Y., 27th Ann. Rept., pp. 117-131. 1875.
Silurian. New York. Includes Coralline limestone of New York.

Niagara limestone, Winchell. Minn. Geol. and Nat. Hist. Surv., 4th Ann. Rept., p. 53. 1876.
Lower Silurian. Minnesota.

Niagara, Smith. Ala. Geol. Surv., Rept., 1875, pp. 26, 99. 1876.
Silurian. Alabama. Included in Upper Silurian.

Niagara, Hotchkiss. A Geographical and Political Summary of Virginia, p. 22. 1876.
Upper Silurian. Virginia. Exact syns. Surgent, Levant (Formation iv, Rogers).

Niagara, Ashburner. Am. Phil. Soc. Proc., vol. xvi, p. 556. 1877.
Silurian. Pennsylvania.

Niagara limestone, Chamberlin. Geol. of Wis., vol. ii, pp. 335–371. 1877.
Upper Silurian. Wisconsin.

Niagara group, Shaler. Ky. Geol. Surv., vol. iii, new ser., pp. 35, 163–169. 1877.
Silurian. Kentucky. Exact syn. includes all New York formations from top of Medina sandstone to top of Niagara period.

Niagara, Newberry. Ohio Geol. Surv., vol. iii, p. 7. 1878.
Silurian. Ohio. Included in Upper Silurian.

Niagara, Hussey. Ohio Geol. Surv., vol. iii, pp. 443, 447. 1878.
Silurian. Ohio.

Niagara, Orton. Ohio Geol. Surv., vol. iii, pp. 386, 408. 1878.
Silurian. Ohio.

Niagara, St. John. U. S. Geol. and Geog. Surv. of Terr., 11th Ann. Rept., p. 484. 1879.
Silurian. Idaho.

Niagara group, Miller. Cin. Soc. Nat. Hist., Jour., vol. iv, no. iv, pp. 268, 290. 1881.
Silurian.

Niagara, Chamberlin. Geol. of Wis., vol. i, pp. 178, 181–196. 1883.
Upper Silurian. Wisconsin. Includes Mayville beds, Waukesha beds, Racine beds, Byron beds, Lower and Upper Coral beds, and Guelph beds.

Niagara, Hall. Am. Assoc. Adv. Sci., Proc., vol. xxxi, p. 46. 1883.
Silurian. Eastern U. S., Mississippi Valley.

Niagara limestone, Winchell. Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. i, p. 302. 1884.
Minnesota.

Niagara group, Linney. Ky. Geol. Surv. (Proctor), Geol. of Clark and Montgomery Cos. 1884.
Silurian. Kentucky. Included in Upper Silurian.

Niagara, Linney. Ky. Geol. Surv., Geol. of Spencer and Nelson Cos., pp. 36–45. 1884.
Silurian. Kentucky.

Niagara, Knott. Ky. Geol. Surv., Geol. of Marion Co., p. 15. 1885.
Silurian. Kentucky.

Niagara, Linney. Ky. Geol. Surv., Geol. of Bath Co., p. 21. 1886.
Silurian. Kentucky.

Niagara, Ringneberg. Am. Geol., vol. i, pp. 264–272. 1888.
Silurian. New York.

Niagara group, Miller. N. A. Geol. and Pal., p. 50. 1889.

Niagara group, Orton. U. S. Geol. Surv., 8th Ann. Rept., pt. ii, p. 561. 1889.
Silurian. Ohio, Indiana.

Niagara group, Orton. Ohio Geol. Surv., 3d Organization, 1st Ann. Rept., pp. 18–20. 1890.
Silurian. Ohio. Includes Niagara limestone and shale, Guelph limestone and Hillsboro sandstone. Part. syn. Guelph limestone.

Niagara limestone, Hopkins. Ark. Geol. Surv., 1890, vol. iv, pp. 51, 60, 81, 213.
Silurian. Arkansas. Includes Meniscus (Tenn.), Galt or Guelph (Canada), and Leclaire (Iowa) limestone, and Athens (Ill.) marble. Part. syn. Cliff limestone (Ohio).

Niagara, Phinney. U. S. Geol. Surv., 11th Ann. Rept., pt. i, p. 632. 1891.
Silurian. Indiana.

Niagara limestone, McGee. U. S. Geol. Surv., 11th Ann. Rept., pt. i, p. 323. 1891.
Silurian. Iowa.

Niagara, Prosser. Roch. Acad. Sci., Proc., vol. ii, pp. 50–124. 1892.
Silurian. New York.

Niagara limestone, Keyes. Iowa Geol. Surv., 1st Ann. Rept., vol. i, p. 30. 1893.
Silurian. Iowa. Included in Upper Silurian.

Niagara, Houser. Iowa Geol. Surv., 1st Ann. Rept., vol. i, pp. 199-207. 1893.
Silurian. Iowa.

Niagara, Brumell. Geol. Soc. Am., Bull., vol. iv, pp. 227, 231. 1893.
Silurian. Ontario.

Niagara, Prosser. Geol. Soc. Am., Bull., vol. iv, pp. 100, 108. 1893.
Silurian. New York.

Niagara, Darton. N. Y. State Geol., 13th Ann. Rept., pp. 206-207, 218. 1894.
Silurian. New York.

Niagara limestone, Udden. U. S. Geol. Surv., 17th Ann. Rept., pt. ii, p. 834. 1896.
Silurian. Illinois.

Niagara series, Calvin. Iowa Geol. Surv., vol. v, pp. 48-60. 1896.
Silurian. Iowa. Includes Delaware, Leclaire, Anamosa, and Bertram stages.

Niagara limestone, Luther. N. Y. State Geol., 15th Ann. Rept., pp. 247-250. 1897.
Silurian. New York.

Niagara formation, Buckley. Wis. Geol. and Nat. Hist. Surv., Bull. No. 4, Econ. ser., No. 2, pp. 298-348. 1898.
Wisconsin.

Niagara limestone, Calvin. Iowa Geol. Surv., vol. viii, pp. 144-159, 216-220. 1898.
Silurian. Iowa. Includes Delaware stage.

Niagara, Barlow. Can. Geol. Surv., Rept. new ser., vol. x, p. 123I. 1898.
Silurian. Ontario and Quebec.

Niagara group, Luther. N. Y. State Geol., 16th Ann. Rept., p. 204. 1899.
Silurian. New York.

Niagaran, Clarke and Schuchert. Science, new ser., vol. x, pp. 876-877. 1899.
Silurian. New York. Includes Clinton beds, Rochester shale, Lockport limestones, and Guelph dolomite.

Niagara, Clark. Md. Geol. Surv., vol. iii, p. 97. 1899.
Silurian. Maryland. Included in Silurian. Exact syn. Lewiston (Helderberg).

Niagara limestone, Calvin and Bain. Iowa Geol. Surv., vol. x, p. 445. 1900.
Silurian. Iowa.

Niagara formation, O'Harra. Md. Geol. Surv., Allegany County, p. 91. 1900.
Silurian. Maryland.

Nichols shale, Hayes. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 20. 1895.
Cambrian. Tennessee. Included in Chilhowee series.

Nichols shale, Keith. U. S. Geol. Surv., Geol. Atlas of U. S., Folios 16, 25. 1895, 1896.
Cambrian. Tennessee and North Carolina.

Nicola series, Dawson. Can. Geol. Surv., Rept., 1877-78, pp. 74B-81B, 171B. 1879.
Triassic(?). British Columbia. Red Beds (E. of Wahsatch) and Star Peak group (W. of Wahsatch) of 40th Par. Survey.

Nicola, Dawson. Can. Geol. Surv., new ser., vol. vii, pp. 26B, 49B-58B, 112B-114B, 130B-146B. 1896.
Juratrias. British Columbia.

Nicollet clay, Harris. Phil. Acad. Nat. Sci., Proc., vol. ii, pp. 235-237. 1846.
Cretaceous.

Nilkoka beds, Brooks. U. S. Geol. Surv., 20th Ann. Rept., pt. vii, pp. 472, 480. 1900.
Alaska.

Nineveh limestone, White. U. S. Geol. Surv., Bull. No. 65, p. 32. 1891.
Carboniferous. Pennsylvania, West Virginia. Included in Permo-Carboniferous, *Dunkard* Creek. Exact syn. Limestone No. 10.

Niobrara division, Meek and Hayden. Phil. Acad. Nat. Sci., Proc., vol. xiii, pp. 419, 422. 1862.
Lower Cretaceous. Nebraska. Exact syn. Formation No. iii.

Niobrara, Hayden. Am. Phil. Soc., Trans., new ser., vol. xii, p. 1, et seq. 1863.
Cretaceous. Northwest.

Niobrara, Hayden. U. S. Geol. Surv. of Wyoming, pp. 87, 90. 1871.
Cretaceous. Included in Lower Cretaceous. Exact syn. Formation No. 3.

Niobrara, Hayden. U. S. Geol. Surv. of Terr., 1–3d Ann. Repts., pp. 49, 54. 1873.
Cretaceous. Exact syn. Formation No. 3.

Niobrara, Cope. U. S. Geol. and Geog. Surv., Mon., vol. ii, pp. 16–24. 1875.
Cretaceous.

Niobrara, Mudge. U. S. Geol. and Geog. Surv. of Terr., Bull., vol. ii, p. 214. 1876.
Cretaceous. Kansas.

Niobrara group, Meek. U. S. Geol. and Geog. Surv. of Terr., Mon., vol. ix, pp. xxx–xxxiii. 1876.
Cretaceous.

Niobrara, Mudge. U. S. Geol. and Geog. Surv. of Terr., 9th Ann. Rept., p. 281. 1877.
Cretaceous. Kansas. Includes Niobrara and Fort Hays.

Niobrara, Hague. U. S. Geol. Expl. of 40th Parallel, vol. ii, pp. 42, 67–71. 1877.
Tertiary. Wyoming. Included in Pliocene.

Niobrara, King. U. S. Geol. Expl. of 40th Parallel, vol. i, p. 425. 1878.
Tertiary. Colorado, Wyoming. Included in Pliocene.

Niobrara group, Newton. Geol. of Black Hills., pp. 173–174. 1880.
Cretaceous. South Dakota.

Niobrara, Stevenson. U. S. Geog. and Geol. Surv. W. of 100th M., vol. iii, Suppl., p. 97. 1881.
Cretaceous. Colorado, New Mexico. Included in Colorado. Exact syn. Cretaceous, No. 3.

Niobrara group, Sternberg. Kansas City Review, vol. v, pp. 1–4. 1881.
Cretaceous. Kansas.

Niobrara, Dawson. Science, vol. i, p. 429. 1883.
Cretaceous. Canada.

Niobrara, Stevenson. Am. Geol., vol. iii, p. 393. 1889.
Cretaceous. Colorado and New Mexico.

Niobrara, Williston. Kansas Acad. Sci., Trans., vol. xiii, pp. 107–111. 1893.
Upper Cretaceous. Kansas.

Niobrara group, Calvin. Iowa Geol. Surv., vol. i, pp. 149–161. 1893.
Cretaceous. Iowa. Exact syn. Inoceramus beds.

Niobrara limestone, Eldridge. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 9. 1894.
Cretaceous. Colorado.

Niobrara chalk, Calvin. Am. Geol., vol. xiv, p. 142. 1894.
Cretaceous. Nebraska and Dakota. Included in Upper Cretaceous.

Niobrara chalk, Calvin. Am. Assoc. Adv. Sci., Proc., vol. xliii, p. 197. 1894.
Cretaceous. Nebraska and Iowa.

Niobrara, Bain. Iowa Geol. Surv., vol. iii, pp. 101–114. 1895.
Cretaceous. Iowa.

Niobrara, Emmons, Cross and Eldridge. U. S. Geol. Surv., Mon., vol xxvii, p. 66. 1896.
Cretaceous. Colorado. Included in Colorado group.

Niobrara group, Gilbert. U. S. Geol. Surv., 17th Ann. Rept., pt. ii, p. 566. 1896.
Cretaceous. Colorado. Includes Timpas formation and Apishapa formation.

Niobrara, Williston. Kansas Univ. Geol. Surv., vol. ii, pp. 235–246. 1897.
Upper Cretaceous. Kansas.

Niobrara group, Logan. Kansas Univ. Geol. Surv., vol. ii, pp. 219–221. 1897.
Upper Cretaceous. Kansas. Includes Fort Hays limestone, and Pteranodon beds in Smoky Hill chalk.

Niobrara formation, Gilbert. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 36. 1897.
Cretaceous. Colorado.

Niobrara, Adams. Kan. Univ. Geol. Surv., vol. iv, pp. 24–27. 1898.
Upper Cretaceous. Kansas. Includes Pteranodon beds (Herperornis and Rudistes beds) and Fort Hays beds.

Niobrara formation, Hills. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 58. 1899.
Cretaceous. Colorado. Apishapa and Timpas formations.

Niobrara, Logan. Jour. of Geol., vol. vii, pp. 89–91. 1899.
Cretaceous. Kansas, Nebraska. Includes Fort Hays limestone, Pteranodon beds.

Nipigon group, Spencer. Can. Nat., 2d ser., vol. viii, pp. 55–70. 1878.
Canada. Exact syn. Copper-bearing series.

Nipigon series, Bell. Can. Geol. Surv., Rept. 1876–77, pp. 213–215. 1878.
Canada. Exact syn. Upper Copper-bearing series.

Nipigon group, Selwyn. Can. Geol. Surv., Rept. 1877–78, p. 15A. 1879.
Canada.

Nipigon, Walcott. Geol. Soc. Am., Bull., vol. x, p. 222. 1899.
Algonkian. Ontario. Part. syn. Keweenawan of Michigan.

Nisconlith series, Dawson. Can. Geol. Surv., new ser., vol. iv, pp. 31B–32B. 1890.
Paleozoic. British Columbia.

Nisconlith series, Dawson. Geol. Soc. Am., Bull., vol. ii, pp. 165, 170. 1891.
Cambrian. British Columbia.

Nisconlith series, Dawson. Can. Geol. Surv., new ser., vol. vii, pp. 26B, 30B–32B. 1896.
Cambrian. British Columbia.

Nisconlith slate, McConnell. Can. Geol. Surv., new ser., vol. x, p. 30A. 1898.
British Columbia.

Nishnabotany sandstone, White. Iowa Geol. Surv., vol. i, pp. 289–291. 1870.
Cretaceous. Iowa.

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Minnesota.

Nishnabotany sandstone, Keyes. Iowa Geol. Surv., vol. i, pp. 134–135. 1893.
Cretaceous. Iowa.

Nishnabotany sandstone, Lonsdale. Iowa Geol. Surv., vol. iv, pp. 412–423. 1895.
Cretaceous. Iowa.

Nishnabotany sandstone, White. Am. Jour. Sci., 2d ser., vol. xliv, pp. 27, 119. 1898.
Cretaceous. Iowa. Exact syn. Dakota (?).

Nodaway limestone, Gallager. Mo. Geol. Surv., Bien. Rept., p. 53. 1898.
Upper Carboniferous. Missouri. Included in Upper Coal Measures.

Nogales division, Dumble. Am. Inst. Mg. Engrs., Trans., vol. xxix, p. 128. 1900.
Tertiary. Mexico.

Noix oölite, Keyes. Iowa Acad. Sci., Proc., vol. v, p. 62. 1898.
Silurian. Iowa.

Nolichucky shale, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 12. 1894.
Cambrian. Kentucky, Virginia, and Tennessee.

Nolichucky shale, Walcott. Geol. Soc. Am., Bull., vol. v, p. 195. 1894.
Cambrian. Virginia.

Nolichucky shale, Keith. U. S. Geol. Surv., Geol. Atlas of U. S., Folios Nos. 16, 25, 27. 1895, 1896.
Cambrian. Tennessee and North Carolina.

Nolichucky shale, Keith. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 33. 1896.
Cambrian. Tennessee. Included in Conasauga shale.

Nolichucky shale, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 44, 1897.
Cambrian. Virginia, West Virginia.

Nolichucky shale, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 59. 1899.
Cambrian. Virginia, Tennessee.

Norian, Hitchcock. Am. Assoc. Adv. Sci., Proc., vol. xxi, p. 136. 1872.
Archean. New Hampshire.

Norian, Crosby. Report on Geol. Map of Mass., pp. 7–11. 1876.
Massachusetts.

Norian series, Hunt. 2d Pa. Geol. Surv., Rept. E, pp. 161–164. 1878.
Archean. Canada.

Norian series, Selwyn. Can. Geol. Surv., Rept. 1877–78, pp. 10A, 12A–13A. 1879.
Canada.

Norian, Hunt. Smithsonian Inst. Ann. Rept., 1882, p. 336. 1884.
Eozoic. N. E. America. Included in Archean. Includes Upper Laurentian or Labradorian.

Norian, Whitney and Wadsworth. Harvard Coll. Mus. Comp. Zool., Bull., vol. vii, 1880–84, pp. 561, 562. 1884.
Azoic.

Norian, Pumpelly. Geol. Soc. Am., Bull., vol. iv, p. 383. 1893.
Archean. Canada (?).

Normandy limestone, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S. Folio No. 53. 1899.
Silurian. Tennessee. Exact syns. Chickamauga limestone, Nashville series.

Norristown shale, Lyman. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. ii, pp. 2612–2616. 1895.
Juratrias, Permian (?). Pennsylvania. Included in New Red.

Norristown stage, Stevenson. N. Y. Acad. Sci., Trans., vol. xv, p. 51. 1896.
Carboniferous. Arkansas, Indian Territory.

North Denison, Hill. Geol. Soc. Am., Bull., vol. v, p. 302. 1894
Cretaceous. Indian Territory. Included in Denison beds, Washita division.

North Haven greenstone, Smith. Geol. of the Fox Islands, pp. 13–17. 1896.
Pre-Silurian. Maine.

North Park group, King. U. S. Geol. Expl. of 40th Parallel, vol. i, p. 431. 1878.
Tertiary. Wyoming. Included in Pliocene.

North Valley Hill sandstone, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. i, p. 166 et seq. 1892.
Cambrian. Pennsylvania.

North Vernon limestone, Borden. Indiana Geol. Surv., 7th Ann. Rept., 1875, pp. 148, 160. 1876.
Devonian. Indiana.

North Vernon bluestone, Cox. Indiana Geol. Surv., 8th, 9th, and 10th Ann. Repts., 1876, 1877, 1878, p. 88. 1879.
Indiana.

North Vernon stone, Elrod. Indiana Dept. Geol. and Nat. Hist., 11th Ann. Rept., 1881, pp. 174, 186. 1882.
Carboniferous. *Indiana.*

Norton formation, Campbell. U. S. Geol. Surv., Bull. No. 111, p. 34. 1893.

Carboniferous. Virginia. Included in Coal Measures. Exact syn. Lower Coal Measures.

Norton, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 12. 1894.

Carboniferous. Kentucky, Virginia, Tennessee.

Norton zone, Williston. Kan. Univ. Quart., vol. iv., p. 251. 1896.

Upper Cretaceous. Kansas. Included in Smoky Hill chalk.

Norton formation, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 59. 1899.

Carboniferous. Virginia and Tennessee.

Novaculite series, Ashley. Am. Phil. Soc., Proc., vol. xxxvi, pp. 228 et seq. 1897.

Carboniferous. Arkansas.

Nulato sandstone, Spurr. U. S. Geol. Surv., 18th Ann. Rept., pt. iii, p. 196. 1898.

Tertiary. Alaska. Included in Miocene.

Nulato beds, Becker. U. S. Geol. Surv., 18th Ann. Rept., pt. iii, pl. i. 1898.

Alaska.

Numbers I, II, III, IV, Meek and Hayden. Am. Jour. Sci., 2d ser., vol. xxviii, pp. 219–226. 1859.

Cretaceous. Kansas and Nebraska.

Number I, Rogers. Pa. State Geol., 2d Ann. Rept., pp. 20–23. 1838.

Cambrian. Pennsylvania.

Number I, Rogers. Pa. State Geol., 4th Ann. Rept., pp. 38, 46. 1840.

Cambrian. Pennsylvania.

Number I, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. i, pp. 165–186. 1892.

Cambrian. Pennsylvania. Includes Chiques sandstone, Hellam quartz, North Valley, Hill sandstone, Potsdam, and Upper Cambrian quartzite. Exact syn. Primal sandstone.

Number II, Rogers. Pa. State Geol., 2d Ann. Rept., pp. 23–30. 1838.

Silurian. Pennsylvania.

Number II, Rogers. Pa. State Geol., 4th Ann. Rept., pp. 41, 44, 53, 99, 134. 1840.

Silurian. Pennsylvania.

Number II, Prime. 2d Pa. Geol. Surv., Rept. D, pp. 7–15. 1875.

Silurian. Pennsylvania. Includes Calciferous, Chazy, Birdseye, and Black River of New York.

Number II, Prime. 2d Pa. Geol. Surv., Rept. D^2, pp. 11–22. 1878.

Silurian. Pennsylvania. Exact syn. Siluro-Cambrian.

Number II, Hall. 2d Pa. Geol. Surv., Rept. C^6, pp. 34–38. 1881.

Silurian. Pennsylvania.

Number II, Prime. 2d Pa. Geol. Surv., Rept. D^3, pt. i, pp. 161–201. 1883.

Silurian. Pennsylvania.

Number II, D'Invilliers. 2d Pa. Geol. Surv., Rept. D^3, pt, ii, pp. 137–196. 1883.

Silurian. Pennsylvania. Includes Auroral and Matinal of Rogers, Calciferous, Chazy, etc., of New York.

Number II, Ewing. 2d Pa. Geol. Surv., Rept. T^4, pp. 401–424. 1884.

Silurian. Pennsylvania. Includes Trenton, Chazy, Calciferous, etc. Exact syn. Great Valley limestone.

Number III, Rogers. Pa. State Geol., 2d Ann. Rept., pp. 30–36. 1838.

Silurian. Pennsylvania.

Number III, Rogers. Pa. State Geol., 4th Ann. Rept., pp. 64, 101, 104. 1840.

Silurian. Pennsylvania.

Number III, Sanders. 2d Pa. Geol. Surv., Rept. D^3, pt. i, pp. 83–85. 1883.

Silurian. Pennsylvania. Exact syn. Hudson River.

Number III, Lesley. 2d Pa. Geol. Surv., Rept. D^3, pt. i, pp. 32–35. 1883.

Silurian. Pennsylvania. Exact syn. Hudson River.

Number III, Ewing. 2d Pa. Geol. Surv., Rept. T^4, pp. 424–427. 1884.
Silurina. Pennsylvania. Includes Hudson River and Utica.

Number III, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. i, pp. 525–624. 1892.
Silurian. Pennsylvania. Includes Utica and Hudson River slate.

Number IV, Rogers. Pa. State Geol., 2d Ann. Rept., pp. 36–39. 1838.
Silurian. Pennsylvania.

Number IV, Rogers. Pa. State Geol., 3d Ann. Rept., pp. 47–49. 1839.
Silurian. Pennsylvania.

Number IV, Rogers. Pa. State Geol., 4th Ann. Rept., pp. 69, 102, 105, 137. 1840.
Silurian. Pennsylvania.

Number IV, Ewing. 2d Pa. Geol. Surv., Rept. T^4, pp. 427–429. 1884.
Silurian. Pennsylvania. Includes Oneida and Medina.

Number IV, D'Invilliers. 2d Pa. Geol. Surv., Rept. F^4, pp. 78–79. 1891.
Silurian. Pennsylvania. Includes Medina and Oneida.

Number IV, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. i, pp. 625–719. 1892.
Silurian. Pennsylvania. Includes Oneida and Medina.

Number V, Rogers. Pa. State Geol., 2d Ann. Rept., pp. 39–46. 1838.
Silurian. Pennsylvania.

Number V, Rogers. Pa. State Geol., 4th Ann. Rept., pp. 78, 140. 1840.
Silurian. Pennsylvania.

Number V, Ewing. 2d Pa. Geol. Surv., Rept. T^4, p. 429. 1884.
Silurian. Pennsylvania. Exact syn. Clinton group.

Number V, D'Invilliers. 2d Pa. Geol. Surv., Rept. F^4, pp. 62–78. 1891.
Silurian. Pennsylvania. Includes Salina and Clinton.

Number V, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, pp. 721–897. 1892.
Silurian. Pennsylvania. Includes Clinton, Niagara, Salina, Barree group, McCoytown sandstone, Lost Creek limestone, Bloomsburg shale, and Bridgeport sandstone.

Number VI, Rogers. Pa. State. Geol., 2d Ann. Rept., pp. 46–50. 1838.
Silurian. Pennsylvania.

Number VI, Rogers. Pa. State Geol., 4th Ann. Rept., pp. 84–143. 1840.
Silurian. Pennsylvania. Exact syn. Fossiliferous limestone.

Number VI, Ewing. 2d Pa. Geol. Surv., Rept. T^4, pp. 429–430. 1885.
Silurian. Pennsylvania. Exact syn. Lower Helderberg.

Number VI, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, pp. 898–1033. 1892.
Silurian. Pennsylvania. Includes Stormville shale, Bossardville limestone, Poxono Island shale, Bastard limestone, Lewistown limestone, and Clarks Mill shale. Exact syn. Lower Helderberg.

Number VII, Rogers. Pa. State Geol., 2d Ann. Rept., pp. 50–52. 1838.
Devonian. Pennsylvania.

Number VII, Rogers. Pa. State Geol., 4th Ann. Rept., pp. 88–143. 1840.
Devonian. Pennsylvania. Exact syn. Fossiliferous sandstone.

Number VII, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, pp. 1034–1142. 1892.
Devonian. Pennsylvania. Includes Oriskany, Canda-Galli and Schoharie grits.

Number VIII, Rogers. Pa. State Geol., 2d Ann. Rept., pp. 52–59. 1838.
Devonian. Pennsylvania. Exact syn. Olive slate.

Number VIII, Rogers. Pa. State Geol., 4th Ann. Rept., pp. 91, 146. 1840.
Devonian. Pennsylvania. Exact syn. Olive slate.

Number VIII, Chance. 2d Pa. Geol. Surv., Rept. G^4, pp. 105–106. 1880.
Devonian. Pennsylvania. Includes Chemung and Portage.

Number VIII, Stevenson. 2d Pa. Geol. Surv., Rept. T^2, pp. 75–84. 1882.
Devonian. Pennsylvania. Includes Chemung, Portage, Genesee, Hamilton, and Marcellus.

Number VIII, D'Invilliers. 2d Pa. Geol. Surv., Rept. F^4, pp. 45–50. 1891.
Devonian. Pennsylvania. Includes Chemung, Portage, Geneseee, Hamilton, and Marcellus.

Number VIIIa, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, pp. 1143–1193. 1892.
Devonian. Pennsylvania. Includes Upper Helderberg, Onondaga, and Corniferous limestones.

Number VIIIb, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, pp. 1194–1236. 1892.
Devonian. Pennsylvania. Exact syn. Marcellus, black shale.

Number VIIIc, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, pp. 1236–1307. 1892.
Devonian. Pennsylvania. Exact syn. Hamilton.

Number VIIId, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, pp. 1307–1322. 1892.
Devonian. Pennsylvania. Exact syn. Tully limestone.

Number VIIIe, Lesley. 2d Pa. Geol Surv., Final Rept., vol. ii, pp. 1323–1335. 1892.
Devonian. Pennsylvania. Exact syns. Genesee black slate, Cadent Upper black slate.

Number VIIIf, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, pp. 1337–1370. 1892.
Devonian. Pennsylvania. Includes Cashaqua shale and Gardeau shale. Exact syn. Portage.

Number VIIIg, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, pp. 1371–1566. 1892.
Devonian. Pennsylvania. Exact syn. Chemung.

Number IX, Rogers. Pa. State Geol., 2d Ann. Rept., pp. 59–63. 1838.
Devonian. Pennsylvania.

Number IX, Rogers. Pa. State Geol., 4th Ann. Rept., pp. 97, 147. 1840.
Devonian. Pennsylvania.

Number IX, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, pp. 1567–1627. 1892.
Devonian. Pennsylvania. Exact syn. Catskill.

Number X, Rogers. Pa. State Geol., 2d Ann. Rept., pp. 63–65. 1838.
Carboniferous. Pennsylvania.

Number X, Rogers. Pa. State Geol., 4th Ann. Rept., p. 98. 1840.
Carboniferous. Pennsylvania.

Number X, Platt. 2d Pa. Geol. Surv., Rept. H^4, p. 311. 1878.
Carboniferous. Pennsylvania. Exact syns. Pocono-Vespertine.

Number X, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. i, pp. 1629–1789. 1895.
Carboniferous. Pennsylvania. Exact syn. Pocono formation.

Number XI, Rogers. Pa. State Geol., 2d Ann. Rept., pp. 65–68. 1838.
Carboniferous. Pennsylvania.

Number XI, Rogers. Pa. State Geol., 4th Ann. Rept., p. 98 et seq. 1840.
Carboniferous. Pennsylvania.

Number XI, Platt. 2d Pa. Geol. Surv., Rept. H^4, p. 311. 1878.
Carboniferous. Pennsylvania. Exact syns. Mauch Chunk red shale, Umbral.

Number XI, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. i, pp. 1805–1853. 1895.
Carboniferous. Pennsylvania. Exact syns. Mauch Chunk red shale, Umbral.

Number XII, Rogers. Pa. State Geol., 2d Ann. Rept., pp. 68–71. 1838.
Carboniferous. Pennsylvania.

Number XII, Rogers. Pa. State Geol., 4th Ann. Rept., pp. 123–132, 199. 1840.
Carboniferous. Pennsylvania.

Number XII, Lesley. 2d Pa. Geol. Surv., Rept. I, pp. 63–66. 1875.
Carboniferous. Pennsylvania and Ohio.

Number XII, White. 2d Pa. Geol. Surv., Rept. Q^2, pp. 51–70. 1877.
Carboniferous. Pennsylvania. Includes Piedmont or Tionesta sandstone, Mercer limestone, Connoquenessing sandstone, and Quakertown shale.

Number XII, Platt. 2d Pa. Geol. Surv., Rept. H^4, p. 310. 1878.
Carboniferous. Pennsylvania. Exact syn. Pottsville conglomerate.

Number XII, Chance. 2d Pa. Geol. Surv., Rept. G^4, pp. 91–95. 1880.
Carboniferous. Pennsylvania.

Number XII, D'Invilliers. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. i, pp. 1857–1915. 1895.
Carboniferous. Pennsylvania. Includes Homewood or Johnson Run sandstone, Connoquenessing or Kinzua sandstone, and Sharon, Olean or Garland conglomerate. Exact syns. Pottsville conglomerate, Seral conglomerate.

Number XII, D'Invilliers. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. ii, pp. 2155–2405. 1895.
Carboniferous. Pennsylvania. Exact syn. Lower Productive Measures, Allegheny River series.

Number XII, Smith. 2d Pa. Geol. Surv., Final Rept., vol. ii, pt. i, pp. 1853–1855, 1920–1923, 1949–1951, 1953, 1959, 1966, 1975, 1984, 2000, 2009, 2025, 2031–2032, 2050, 2054. 1895.
Carboniferous. Pennsylvania. Exact syn. Pottsville conglomerate.

Number XIII, Rogers. Pa. State Geol., 2d Ann. Rept., pp. 71–79. 1838.
Carboniferous. Pennsylvania. Exact syn. Anthracite Coal Measures.

Number XIII, Rogers. Pa. State Geol., 3d Ann. Rept., pp. 82–87. 1839.
Carboniferous. Pennsylvania. Included in Coal Measures.

Number XIV, D'Invilliers. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. ii, pp. 2406–2447. 1895.
Carboniferous. Pennsylvania. Exact syns. Barren Measures, Pittsburg series, and Elk River series of West Virginia.

Number XV, D'Invilliers. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. ii, pp. 2448–2564. 1895.
Carboniferous. Pennsylvania. Exact syns. Upper Productive or Monongahela River series.

Number XVI, D'Invilliers. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. ii, pp. 2565–2588. 1895.
Carboniferous. Pennsylvania. Includes Greene Co. group and Washington Co. group. Exact syns. Upper Barren Measures, and Permo-Carboniferous or Dunkard Creek series.

Nummulite limestone, Lyell. Am. Jour. Sci., 2d ser., vol. iv, pp. 186–191. 1847.
Eocene. Alabama. Exact syn. Orbitolite limestone.

Nunda group, Vanuxem. Geol. of N. Y., pt. iii, p. 172. 1842.
Paleozoic. New York. Included in New York system. Exact syn. Portage group.

Nunda group, Hall. Geol. of N. Y., pt. iv, 4th Geol. Dist., pp. 18, 224–241. 1843.
Paleozoic. New York. Included in New York system. Exact syn. Portage group.

Nushagak beds, Spurr. U. S. Geol. Surv., 20th Ann. Rept., pt. vii, pp. 173–174, 184. 1900.
Tertiary. Alaska. Included in Neocene.

Nussbaum formation, Gilbert. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 36. 1897.
Colorado. Included in Neocene.

Nussbaum formation, Hills. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 58. 1899.
Colorado. Included in Neocene(?).

Nussbaum formation, Hills. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 68. 1900.
Colorado. Included in Neocene.

Nutzotin series, Brooks. U. S. Geol. Surv., 21st Ann. Rept., pt. ii, p. 359. 1900.
Alaska.

Oak Creek beds, Ward. U. S. Geol. Surv., 19th Ann. Rept., pt. ii, p. 593. 1899.
Cretaceous. South Dakota.

Oak Creek beds, Jenney. U. S. Geol. Surv., 19th Ann. Rept., pt. ii, pp. 568–587, 593. 1899.
Cretaceous. South Dakota. Included in Dakota group.

Oak Grove sands, Dale. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, p. 340. 1898.
Tertiary. Florida.

Oakland limestone lentils, Diller. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 49. 1898.
Oregon. Included in Eocene.

Oakville, Dumble. Jour. of Geol., vol. ii, pp. 556–559. 1894.
Tertiary. Texas. Included in Miocene.

Oakville beds, Dall. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, p. 339. 1898.
Tertiary. Texas. Included in Miocene. Part. syn. Fayette beds.

Ocala group, Dall. Wagner Free Inst. Sci., Trans., vol. iii, pt. ii, p. 209. 1892.
Eocene. Florida. Included in Later Eocene. Exact syn. Nummulite beds of Florida.

Ocala limestone, Dall and Harris. U. S. Geol. Surv., Bull. No. 84, p. 103. 1892.
Tertiary. Florida. Exact syn. Nummulitic beds.

Oceanic series, Hill. Harvard Coll. Mus. Comp. Zool., Bull., vol. xxxiv, pp. 69–85. 1899.
Tertiary. Jamaica. Included in Oligocene. Includes Cobre, Moneague, and Montpelier formations.

Ocheesee beds, Dall and Harris. U. S. Geol. Surv., Bull. No. 84, p. 105. 1892.
Tertiary. Florida. Included in Miocene, Chattahoochee group.

Ocheesee beds, Dall. Wagner Free Inst. Sci., Trans., vol. iii, pt. ii, p. 209. 1892.
Miocene. Florida. Included in Chipola epoch, Chattahoochee group. Part. syn. Chattahoochee group.

Ocoee conglomerate and slates, Safford. Geol. Reconn. of the State of Tenn., 1st Rept., pp. 151–152. 1856.
Tennessee. Included in Metamorphic Rocks.

Ocoee conglomerate and slates, Safford. Geol. of Tenn., by Safford, pp. 183–198. 1869.
Silurian. Tennessee. Included in Potsdam group.

Ocoee group, Killebrew and Safford. Resources of Tennessee, pp. 28–29. 1874.
Silurian. Tennessee. Included in Potsdam period.

Ocoee group, Bradley. Am. Jour. Sci., 3d ser., vol. ix, p. 283. 1875.
Cambrian. Tennessee. Exact syn. Lower Potsdam (Acadian).

Ocoee, Little. Hand-book of Ga., Com. of Agric., 1876, p. 41. 1876.
Silurian. Georgia. Included in Lower Primordial. Part. syn. Acadian.

Ocoee conglomerate, Walcott. U. S. Geol. Surv., Bull. No. 81, pp. 143, 252, 299. 1891.
Cambrian. Appalachian region.

Ocoee, Spencer. Ga. Geol. Surv., The Paleozoic Group, p. 34. 1893.
Cambrian. Georgia. Included in Lower Cambrian(?).

Ocoee series, Hayes. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 20. 1895.
Algonkian(?). Tennessee. Includes Wilhite slate, Citico conglomerate, Pigeon slate, and Thunderhead conglomerate and slate.

Ocoee group, Keith. U. S. Geol. Surv., Geol. Atlas of U. S., Folios Nos. 16, 25. 1895, 1896.
Algonkian(?). Tennessee, North Carolina. Includes Wilhite slate, Citico conglomerate, Pigeon slate, Cades conglomerate, Thunderhead conglomerate, Hazel slate, and Clingman conglomerate.

Ocoee, Smith. Ala. Geol. Surv., Bull. No. 5, p. 110. 1896.
Algonkian. Alabama. Exact syn. Talladega.

Oceya Creek, Turner. Am. Geol., vol. xiii, p. 239. 1894.
Tertiary. California. Included in Miocene.

Ocoya Creek beds, Turner. U. S. Geol. Surv., 14th Ann. Rept., pt. ii, p. 461. 1894.
Tertiary. California. Included in Miocene.

Odanah series, Tyrrell. Can. Geol. Surv., new ser., vol. v, pt. i, pp. 83E, 84E, 85E, 199 E, 212E–215E. 1893.
Cretaceous. British Columbia. Included in Pierre.

Ogallala formation, Darton. U. S. Geol. Surv., 19th Ann. Rept., pt. iv, pp. 734–735, 741–742. 1899.
Tertiary. Nebraska. Included in Pliocene(?).

Ogden quartzite, King. Am. Jour. Sci., 3d ser., vol. xi, p. 478. 1876.
Devonian. Nevada.

Ogden quartzite, Emmons. U. S. Geol. Expl. of 40th Parallel, vol. ii, p. 343, et seq. 1877.
Devonian. Utah.

Ogden quartzite, Hague. U. S. Geol. Expl. of 40th Parallel, vol. ii, p. 400. 1877.
Devonian. Utah.

Ogden quartzite, King. U. S. Geol. Expl. of 40th Parallel, vol. i, pp. 127–248. 1878.
Devonian. Utah, Nevada.

Ogden flint, Prosser. Geol. Soc. Am., Bull., vol. vi, p. 48. 1894.
Carboniferous, Permian. Kansas.

Ogishke conglomerate, Winchell. Minn. Geol. and Nat. Hist. Surv., 16th Ann. Rept., pp. 344–350, 359. 1888.
Minnesota.

Ogishke conglomerate, Winchell. Am. Assoc. Adv. Sci., Proc., vol. xxxviii, p. 234. 1889.
Algonkian. Lake Superior region. Included in Vermilion series.

Ogishke conglomerate, Grant. Am. Geol., vol. x, p. 4. 1892.
Archean. Minnesota.

Ohio black slate, Andrews. Ohio Geol. Surv., Rept. Prog., 1869, p. 62. 1870.
Ohio.

Ohio shale, Shaler. Ky. Geol. Surv., new ser., vol. iii, pp. 169–175. 1877.
Devonian. Kentucky. Exact syns. Huron shale. Includes all from top of Oriskany to top of Chemung.

Ohio shale, Orton. Rev. of Strat. Geol. of eastern Ohio, p. 4. 1880.
Devonian. Ohio. Exact syn. Black shale.

Ohio shale, Orton. Ohio Geol. Surv., vol. vi, pp. 4, 23. 1888.
Carboniferous. Ohio. Includes Cleveland shale, Erie shale, and Huron shale.

Ohio shale, Herrick. Denison Univ. Sci. Lab., Bull., vol. iii, p. 26. 1888.
Devonian. Ohio.

Ohio shale, Orton. U. S. Geol. Surv., 8th Ann. Rept., pt. ii, p. 570. 1889.
Devonian. Ohio, Indiana. Includes Cleveland, Huron, and Erie shales.

Ohio shale, Orton. Ohio Geol. Surv., Prelim. Rept. Petroleum and Inflammable Gas, pp. 23, 62. 1886.
Ohio.

Ohio shale, Orton. Ohio Geol. Surv., 3d Organization, 1st Ann. Rept., pp. 27–33, pp. 248–249. 1890.
Devonian. Ohio. Includes Cleveland shale, Erie shale, and Huron shale. Part. syn. Genesee slate, Portage and Chemung groups.

Ohio shale, Orton. Ohio Geol. Surv., vol. vii, pp. 4, 21. 1893.
Devonian. Ohio. Includes Cleveland shale, Erie shale, and Huron shale.

Ohio, Eldridge. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 9. 1894.
Cretaceous. Colorado.

Ohio Creek, Cross. U. S. Geol. Surv., Mon., vol. xxvii, p. 219. 1896.
Cretaceous. Colorado. Part. syns. Arapahoe.

Ohio shale, Bownocker. Denison Univ. Sci. Lab., Bull., vol. ii, art. ii, p. 14. 1898.
Ohio.

Oil Creek Lake group, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. i, p. 1767. 1895.
Carboniferous. Pennsylvania. Included in No. 10, Pocono. Includes Corry sandstone, 3d Mountain sandstone, Cussewago shale, limestone, and sandstone. Exact syn. Berea group of Ohio.

Oil Lake group, White. 2d Pa. Geol. Surv., Rept. Q^4, pp. 91–98. 1881.
Carboniferous. Pennsylvania. Includes Corry and Cussewago sandstone and shales. Exact syns. Berea grit, Pithole grit. Part. syn. Pocono.

Oklune series, Spurr. U. S. Geol. Surv., 20th Ann. Rept., pt. vii, pp. 163–169, 181. 1900.
Cretaceous. Alaska.

Old Red sandstone, Hall. Geol. of N. Y., pt. iv, 4th Geol. Dist., pp. 278–283. 1843.
Paleozoic. New York. Includes Catskill group, Montrose and Oneonta sandstone, No. 11, Pennsylvania Survey.

Old Red sandstone, Lesley. 2d Pa. Geol. Surv., Rept. I, pp. 97–102. 1875.
Devonian. Pennsylvania and New York. Exact syn. No. IX.

Olean conglomerate, Sub-, Carll. 2d Pa. Geol. Surv., Rept. I^4, pp. 189–195. 1883.
Carboniferous. Pennsylvania. Exact syn. Shenango sandstone.

Olean conglomerate, Ashburner. 2d Pa. Geol. Surv., Rept. R^2, pp. 396–397. 1885.
Carboniferous. Pennsylvania.

Olean conglomerate, Sub-, Ashburner. 2d Pa. Geol. Surv., Rept. R^2, p. 402. 1885.
Carboniferous. Pennsylvania.

Olean Conglomerate, Sub-, Carll. 2d Pa. Geol. Surv., Rept. I^5, pp. 105–110. 1890.
Carboniferous, Pennsylvania. Included in Pocono. Exact syns. Shenango sandstone and Logan sandstone.

Olean conglomerate. Randall. Regents Univ. of N. Y., 47th Ann. Rept., p. 715. 1894.
New York.

Oleon, Sub-, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. i, p. 1733 et seq. 1895.
Carboniferous. Pennsylvania. Included in No. 10, Pocono.

Olean conglomerate, D'Invilliers. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. i, pp. 1861, 1873, 1892. 1895.
Carboniferous. Pennsylvania. Included in No. 12, Pottsville conglomerate.

Olentangy shale, Winchell. Ohio Geol. Surv., vol. ii, pp. 243, 287. 1874.
Devonian. Ohio.

Olentangy shale, Orton. Ohio Geol. Surv., vol. vi, pp. 4, 22. 1888.
Devonian. Exact syn. Hamilton shale (?).

Olentangy shale, Orton. Ohio Geol. Surv., 3d Organization, 1st Ann. Rept., pp. 26-27. 1890.
Devonian. Ohio. Exact syn. Hamilton shale.

Olentangy shale, Orton. Ohio Geol. Surv., vol. vii, pp. 4, 20. 1893.
Devonian. Ohio. Exact syn. Hamilton shale.

Oley Valley slate, D'Invilliers. 2d Pa. Geol. Surv., Rept. D^3, pt. ii, pp. 102-103. 1883.
Cambrian (?). Pennsylvania. Included in Potsdam (?).

Olive shale, Read. Ohio Geol. Surv., vol. iii, pp. 337, 523. 1878.
Carboniferous. Ohio. Included in Waverly.

Oneida conglomerate, Vanuxem. Geol. of N. Y., pt. iii, pp. 71-74. 1842.
Paleozoic. New York. Included in New York system. Includes Shawangunk conglomerate, Millstone grit, Gray band of Rochester, and No. 5, Pennsylvania Survey.

Oneida conglomerate, Hall. Geol. of N. Y., pt. iv, 4th Geol. Dist., pp. 18, 31. 1843.
Paleozoic. New York. Included in New York system. Exact syn. Shawangunk conglomerate.

Oneida conglomerate, Emmons. Agric. of N. Y., vol. i, pp. 125-126. 1846.
Silurian. New York. Included in Champlain division of New York system.

Oneida conglomerate, Jewett. Am. Jour. Sci., 2d ser., vol. xxxviii, p. 121. 1864.
Silurian. New York.

Oneida conglomerate, Cook. Geol. of N. J., pp. 146-149. 1868.
Silurian. New Jersey. Exact syn. Shawangunk conglomerate or grit.

Oneida conglomerate, Newberry. Ohio Geol. Surv., vol. i, pt. i, p. 61. 1873.
Silurian. Ohio.

Oneida, Ashburner. Am. Phil. Soc., Proc., vol. xvi, pp. 532, 558. 1877.
Silurian. Appalachian region. Part. syn. Levant in part.

Oneida, Platt. 2d Pa. Geol. Surv., Rept. T, pp. 44-48. 1881.
Silurian. Pennsylvania. Included in No. 4.

Oneida conglomerate, Miller. Cin. Soc. Nat. Hist., Jour., vol. iv, no. iv, p. 288. 1881.
Silurian. Included in Medina group.

Oneida conglomerate, White. 2d Pa. Geol. Surv., Rept. G^6, pp. 150-152. 1882.
Silurian. Pennsylvania. Included in No. 4, Medina.

Oneida, White. 2d Pa. Geol. Surv., Rept. T^3, pp. 143-147. 1885.
Silurian. Pennsylvania.

Oneida conglomerate, White. N. Y. State Mus., 51st Ann. Rept., vol. i, p. r36. 1899.
Ordovician. New York.

Oneonta sandstone, Hall. N. Y. State Geol., Rept. for 1885, p. 11. 1886.
Devonian. New York.

Oneonta sandstone, Prosser. Geol. Soc. Am., Bull., vol. iv, pp. 93, 108. 1893.
Devonian. New York. Included in Portage.

Oneonta, Prosser. Am. Jour. Sci., 3d ser., vol. xlvi, pp. 213-215. 1893.
Devonian. New York.

Oneonta formation, Darton. Am. Jour. Sci., 3d ser., vol. xlv, pp. 203-209. 1893.
Devonian. New York.

Oneonta, Darton. N. Y. State Geol., 13th Ann. Rept., pp. 238-240. 1894.
Devonian. New York.

Oneonta, Clarke. N. Y. State Geol., 13th Ann. Rept., p. 557. 1894.
Devonian. New York. Exact syn. Portage.

Oneonta sandstones, Clarke. N. Y. State Geol., 15th Ann. Rept., pp. 27-82. 1897.
Devonian. New York.

Oneota limestone, McGee. U. S. Geol. Surv., 11th Ann. Rept., pt. i, p. 331. 1891.
Silurian. Iowa.

Oneota limestone, Hall. Geol. Soc. Am., Bull., vol. iii, p. 464. 1892.
Ordovician. Minnesota. Exact syn. Lower Magnesian.

Oneota, Hall and Sardeson. Geol. Soc. Am., Bull., vol. iii, p. 341. 1892.
Ordovician (?). Minnesota. Included in Magnesian series.

Oneota, Keyes. Iowa Geol. Surv., vol. i, pp. 21-24. 1893.
Silurian. Iowa. Included in Lower Silurian. Exact syn. Lower Magnesian limestone.

Oneota, Hall and Sardeson. Geol. Soc. Am., Bull., vol. vi, pp. 167, 176. 1895.
Upper Cambrian. Minnesota. Included in Magnesian series.

Oneota limestone, Norton. Iowa Geol. Surv., vol. iii, pp. 182–184. 1895.
Silurian. Iowa.

Oneota limestone, Calvin. Iowa Geol. Surv., vol. iv, pp. 61–68. 1895.
Silurian. Iowa. Included in Ordovician. Exact syns. Lower Magnesian limestone, Calciferous.

Onondaga group, Hall. N. Y. Geol. Surv., 3d Ann. Rept., pp. 290–293, 304. 1839.
Silurian. New York.

Onondaga limestone, Hall. N. Y. Geol. Surv., 3d Ann. Rept., pp. 309–310. 1839.
Devonian. New York. Exact syn. Gray crinoidal limestone.

Onondaga salt group, Vanuxem. N. Y. Geol. Surv., 4th Ann. Rept., pp. 375–376. 1840.
Silurian. New York.

Onondaga limestone, Hall. N. Y. Geol. Surv., 4th Ann. Rept., pp. 418–420, 427. 1840.
Devonian. New York.

Onondaga limestone, Hall. N. Y. Geol. Surv., 5th Ann. Rept., pp. 156–158. 1841.
New York.

Onondaga salt group, Mather. N. Y. Geol. Surv., 5th Ann. Rept., pp. 89–90. 1841.
Silurian. New York.

Onondaga salt group, Hall. Am. Jour. Sci., 1st ser., vol. xlii, p. 58. 1842.
New York.

Onondaga system, Conrad. Phil. Acad. Nat. Sci., Jour., vol. viii, pp. 233–234. 1842.
Includes Upper Silurian.

Onondaga limestone, Vanuxem. Geol. of N. Y., pt. iii, pp. 132–138. 1842.
Paleozoic. New York. Included in New York system. Includes Gray sparry limestone.

Onondaga salt group, Vanuxem. Geol. of N. Y., pt. iii, pp. 94–110. 1842.
Paleozoic. New York. Included in New York system. Includes Calciferous slate, Second graywacke with shell lime rock of Eaton.

Onondaga salt group, Hall. Geol. of N. Y., pt. iv, 4th Geol. Dist., pp. 18, 117–140. 1843.
Paleozoic. New York. Included in New York system. Includes Calciferous slate, Second graywacke with shell lime rock of Eaton. Gypseous marls and slates.

Onondaga limestone, Hall. Geol. of N. Y., pt. iv, 4th Geol. Dist., pp. 18, 151–157. 1843.
Paleozoic. New York. Included in New York system. Corniferous lime rock. Includes Gray sparry limestone.

Onondaga limestone, Mather. Geol. of N. Y., pt. i, p. 339. 1843.
Paleozoic. New York. Included in Helderberg division.

Onondaga salt group, Owen. Am. Jour. Sci., 2d ser., vol. i, pp. 43, 57. 1846.
Silurian. New York. Included in Helderberg series (or division) of the New York system. Includes Magnesian deposits and Vermicular lime rock.

Onondaga salt group, Emmons. Agric. of N. Y., vol. i, pp. 153–166. 1846.
New York. Included in Helderberg division of New York system. Includes Manlius water-lime group.

Onondaga limestone, Emmons. Agric. of N. Y., vol. i, pp. 174–179. 1846.
New York. Included in Helderberg division of New York system. Includes Selenurus limerock, Seneca limestone, and Corniferous limestone.

Onondaga salt group, Hall. Pal. of New York, vol. ii, p. 339. 1852.
Silurian. New York.

Onondaga limestone, Meek. Mo. Geol. Surv., 1st and 2d Ann. Repts., pt. ii, p. 103. *1855.*
Devonian. Missouri.

ndaga limestone, Swallow. Mo. Geol. Surv., 1st and 2d Ann. Repts., pp. 107, 178, 196. 1855.

evonian. Missouri.

ndaga salt group, Hall. Iowa Geol. Surv., vol. i, pt. i, pp. 76–80. 1858.

ilurian. Iowa.

ndaga salt group, Hall and Whitney. Am. Jour. Sci., 2d ser., vol. xxvii, p. 112. 1859.

ilurian. Iowa.

ndaga formation, Logan. Can. Geol. Surv., Rept. 1843–63, pp. 345–352. 1863.

pper Silurian. Canada.

ndaga formation, Chapman. Can. Inst., new ser., vol. viii, pp. 437–439. 1863.

ilurian. Canada. Included in Upper Silurian.

ndaga group, Worthen. Ill. Geol. Surv., vol. iii, pp. 23–24, 39–40, 62–63. 1868.

evonian. Illinois.

ndaga limestone, Cook. Geol. of N. J., pp. 165–166. 1868.

evonian. New Jersey.

ndaga, Winchell. Am. Assoc. Adv. Sci., Proc., vol. xxii, p. 103. 1873.

evonian. Ohio.

ndaga, Winchell. Ohio Geol. Surv., vol. ii, p. 340. 1874.

evonian. Ohio. Included in Corniferous.

ndaga limestone, Broadhead. Mo. Geol. Surv., Rept. 1873–1874, p. 27. 1874.

evonian. Missouri.

ndaga, Ashburner. Am. Phil. Soc., Proc., vol. xvi, pp. 530, 555. 1877.

ilurian. Appalachian region. Exact syns. Salina and Scalent.

ndaga salt group, Miller. Cin. Soc. Nat. Hist., Jour., vol. iv, no. iv, pp. 290, 291. 1881.

ilurian.

ndaga group, Englemann and Worthen. Econ. Geol. of Ill., vol. i, pp. 461–462. 1882.

ilurian (?). Illinois.

ndaga salt, Hall. Am. Assoc. Adv. Sci., Proc., vol. xxxi, p. 47. 1883.

ilurian. Eastern United States.

ndaga, Claypole. Am. Phil. Soc., Proc., vol. xxi, p. 497. 1884.

ilurian. Pennsylvania. Exact syn. Gypseous group.

ndaga, White. 2d Pa. Geol. Surv., Rept. T^3, pp. 128–131. 1885.

ilurian. Pennsylvania. Exact syn. Salina.

ndaga, Claypole. 2d Pa. Geol. Surv., Rept. F^2, pp. 52–58. 1885.

ilurian. Pennsylvania. Includes Bridgeport sandstone.

ndaga group, Miller. N. A. Geol. and Pal., p. 54. 1889.

ndaga salt group, Hopkins. Ark. Geol. Surv., 1890, vol. iv, p. 52. 1890.

ilurian. Arkansas. Part. syn. Salina.

ndaga limestone, Hopkins. Ark. Geol. Surv., 1890, vol. iv, pp. 52, 53. 1890.

evonian. Arkansas.

ndaga salt group, Prosser. Roch. Acad. Sci., Proc., vol. ii, pp. 50–124. 1892.

ilurian. New York.

ndaga limestone, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, p. 1143 et seq. 1892.

evonian. Pennsylvania. Included in No. 8a.

ndaga, Brumell. Geol. Soc. Am., Bull., vol. iv, pp. 227, 230. 1893.

ilurian. Ontario.

ndaga salt group, Prosser. Geol. Soc. Am., Bull., vol. iv, pp. 97, 108, 116. 1893.

pper Silurian. New York.

Onondaga limestone, Darton. N. Y. State Geol., 13th Ann. Rept., pp. 203, 207-208, 242-243, 301. 1894.
Devonian. New York. Exact syn. Corniferous.

Onondaga limestone, Ries. N. Y. State Geol., 15th Ann. Rept., p. 403. 1897.
Devonian. New York. Exact syn. Corniferous.

Onondaga limestone, Luther. N. Y. State Geol., 16th Ann. Rept., p. 214. 1899.
Devonian. New York.

Onondaga limestone, Weller. N. J. Geol. Surv., Rept., 1899, p. 45. 1900.
Devonian. New Jersey.

Ontario division, Mather. Geol. of N. Y., pt. i, pp. 353-365. 1843.
Paleozoic. New York. Included in Shawangunk grit.

Ontario division, Emmons. Agric. of N. Y., vol. i, pp. 141-152. 1846.
New York. Includes Medina sandstone, Clinton group, and Niagara group.

Ontario group, Chapman. Can. Inst., new ser., vol. viii, p. 186. 1863.
Silurian. Canada. Included in Lower Siluraina. Includes Birdseye and Black River formation, Trenton, Utica, and Hudson River.

Ontario group, Chapman. A Popular and Practical Exposition of the Minerals and Geology of Canada, p. 157, Toronto. 1864.
Silurian. Canada. Includes Hudson River, Utica, Trenton, Birdseye, and Black River.

Ontarian system, Lawson. Geol. Soc. Am., Bull., vol. i, p. 177. 1889.
Archean. Ontario.

Ontarian, Dana. Geol. Soc. Am., Bull., vol. i, p. 41. 1889.
Upper Silurian. New York, etc. Exact syn. Ontario division of Mather.

Ontarian, Winchell and Grant. Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iv, p. 195. 1899.
Minnesota. Includes Coutchiching and Keewatin.

Ontaric, Clarke and Schuchert. Science, new ser., vol. x, p. 876. 1899.
Silurian. New York. Exact syn. Siluric.

Oostanaia series, Spencer. Ga. Geol. Surv., The Paleozoic Group, pp. 34, 37, 77, 87, 99, 108, 112, 115, 119, 123, 130. 1893.
Cambrian. Georgia. Included in Middle and Upper Cambrian. Includes Knox or Connesauga shale, and Knox or Rome sandstone.

Ophian, Witney and Wadsworth. Harvard Mus. Comp. Zool., Bull., vol. vii, 1880-84, p. 562. 1884.
Included in Azoic system.

Orange Martin limestone, Owen. Geol. Reconn. Indiana, Rept. 1859-60, p. 126. 1862.
Carboniferous. Indiana. Included Eocarboniferous limestone.

Orange Sand group, Safford. Geol. Reconn. of the State of Tenn., 1st Rept., p. 162. 1856.
Cretaceous. Tennessee.

Orange Sand group, Harper. Prelim. Rept. Geol. and Agric. Miss., p. 107. 1857.
Mississippi. Included in rocks overlying the Cretaceous formation.

Orange Sand formation, Hilgard. Rept. on Geol. and Agric., Miss., pp. 4-46. 1860.
Quaternary. Mississippi.

Orange Sand, Safford. Am. Jour. Sci., 2d ser., vol. xxxvii, p. 369. 1864.
Tertiary. Tennessee. Exact syn. La Grange group.

Orange Sand, Hilgard. Am. Jour. Sci., 2d ser., vol. xli, pp. 311-318; vol. xlii, p. 346. 1866.
Quaternary. Mississippi.

Orange Sand or La Grange group, Safford. Geol. of Tenn., pp. 424-428. 1869.
Tertiary. Tennessee.

Orange Sand formation, Hilgard. Am. Jour. Sci., 2d ser., vol. xlviii, p. 334. 1869. Quaternary. Louisiana.

Orange Sand, Hilgard. Am. Jour. Sci., 2d ser., vol. xlvii, pp. 77–88. 1869. Quaternary (?). Louisiana.

Orange Sand, Hilgard. Am. Jour. Sci., 3d ser., vol. ii, pp. 398–401. 1871. Pleistocene. Mississippi Valley and Gulf region.

Orange Sand, Killebrew and Safford. Resources of Tenn., p. 45. 1874. Quaternary. Tennessee.

Orange Sand, Hilgard. Smithsonian Inst. Contr., vol. xxiii, no. 2, p. 3. 1881. Tertiary. Louisiana.

Orange Sand, Salisbury. Am. Jour. Sci., 3d ser., vol. xlii, pp. 252–253. 1891. Tertiary. Illinois.

Orange Sands, Chamberlin and Salisbury. Am. Jour. Sci., 3d ser., vol. xli, pp. 364–377. 1891. Pre-Pleistocene. Mississippi Valley.

Orange Sand, Dall. Wagner Free Inst. Sci., Trans., vol. iii, pt. ii, p. 209. 1892. Pliocene. Gulf and Atlantic States. Included in Floridian epoch, Lafayette group. Part syn. Lafayette group.

Orangeburg formation, Dall. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, p. 344. 1898. Tertiary. Georgia, Alabama. Included in Clairbornian stage, Eocene.

Orangeville shale, White. 2d Pa. Geol. Surv., Rept. Q^4, pp. 89–90. 1881. Carboniferous. Pennsylvania. Included in Meadville group.

Orangeville shale, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. i, p. 1765. 1895. Carboniferous. Pennsylvania. Included in No. 10, Pocono.

Orbitoides limestone, Hopkins. Ark. Geol. Surv., 1890, vol. iv, p. 57. 1890. Tertiary. Arkansas.

Orbitoides limestone, Dall and Harris. U. S. Geol. Surv., Bull. No. 84, p. 101. 1892. Tertiary. Florida. Included in Vicksburg group.

Orbitoitic, Heilprin. Phil. Acad. Nat. Sci., Proc., 1882, pp. 183–184. 1882. Oligocene. Exact syn. Vicksburg beds, Florida beds.

Orbitoitic, Heilprin. Phil. Acad. Nat. Sci., Jour., vol. ix, pp. 117–120. 1884. Tertiary. Included in Oligocene. Exact syns. Vicksburg beds and Florida Nummulitic beds.

Orbitolite limestone, Lyell. Am. Jour. Sci., 2d ser., vol. iv, pp. 186–191. 1847. Eocene. Alabama. Exact syn. Nummulite limestone.

Orca series, Schrader. U. S. Geol. Surv., 20th Ann. Rept., pt. vii, p. 404. 1900. Upper Cretaceous or Tertiary. Alaska.

Orchard gneiss, Kemp. Am. Inst. Mg. Engrs., Trans., vol. xxvii, p. 178. 1898. Archean. New York.

Oread limestone, Haworth. Kan. Univ. Quart., vol., ii, pp. 123–124. 1894. Carboniferous. Kansas.

Oread limestone, Haworth. Am. Jour Sci., 3d ser., vol. l, p. 461. 1895. Carboniferous. Kansas. Included in Coal Measures.

Oread limestone, Haworth. Kan. Univ. Geol. Surv., vol. i, pp. 138, 161, 166. 1896. Carboniferous. Kansas.

Oread limestone, Bennett. Kan. Univ. Geol. Surv., vol. i, pp. 60, 71, 114–116. 1896. Carboniferous. Kansas. Includes the heavy limestone at Atchison.

Oread limestone, Haworth. Kan. Univ. Geol. Surv., vol. iii, pp. 62–64, 93, 94, 104. 1898. Carboniferous. Kansas. Included in Douglas formation.

Oreodon, Wortman. Am. Mus. Nat. Hist., Bull., vol. v, p. 97. 1893.

Tertiary. Included in White River or Lower Miocene.

Oriskany sandstone, Hall. N. Y. Geol. Surv., 3d Ann. Rept., pp. 308–309. 1839.

Devonian. New York.

Oriskany, Conrad. Phil. Acad. Nat. Sci., Jour., vol. viii, pp. 232–233. 1842.

Middle Silurian. New York.

Oriskany sandstone, Vanuxem. Geol. of N. Y., pt. iii, pp. 123–127. 1842.

Paleozoic. New York. Includes White sandstone. Exact syn. No. 7, Pennsylvania Survey.

Oriskany sandstone, Mather. Geol. of N. Y., pt. i, pp. 342–343. 1843.

Paleozoic. New York. Included in Helderberg division.

Oriskany sandstone, Hall. Geol. of N. Y., pt. iv, 4th Geol. Dist., pp. 18, 146–148. 1843.

Paleozoic. New York. Included in New York system. Includes No. 7, Pennsylvania Survey.

Oriskany sandstone, Emmons. Agric. of N. Y., vol. i, pp. 168–171. 1846.

New York. Included in Helderberg division of New York system.

Oriskany sandstone, Hall. Pal. of N. Y., vol. ii, pt. i, pp. 421–425. 1859.

Devonian. New York.

Oriskany sandstone, Hitchcock. Prelim. Rept. Geol. of Maine, vol. i, pp. 243–245. 1861.

Devonian. Maine.

Oriskany formation, Logan. Can. Geol. Surv., Rept. 1843–63, pp. 359–361. 1863.

Devonian. Canada. Included in Upper Helderberg group.

Oriskany formation, Chapman. Can. Inst., new ser., vol. viii, pp. 440–441. 1863.

Devonian. Canada.

Oriskany sandstone, Dawson. Am. Jour. Sci., 2d ser., vol. xxxv, pp. 314–319. 1863.

Devonian. Canada.

Oriskany sandstone, Worthen. Ill. Geol. Surv., vol. i, pp. 124–126. 1866.

Devonian. Illinois.

Oriskany group, Worthen. Ill. Geol. Surv., vol. iii, pp. 24–25, 62. 1868.

Devonian. Illinois. Includes Clear Creek limestones.

Oriskany, Cook. Geol. of N. J., pp. 160–161. 1868.

Devonian. New Jersey.

Oriskany sandstone, Shumard. Mo. Geol. Surv., Repts. 1855–1871, p. 296. 1873.

Devonian. Missouri.

Oriskany, Winchell. Ohio Geol. Surv., vol. i, pt. i, p. 603. 1873.

Devonian. Ohio.

Oriskany, Newberry. Ohio Geol. Surv., vol. i, pt. i, pp. 67, 140. 1873.

Devonian. Ohio.

Oriskany, Newberry. Ohio Geol. Surv., vol. ii, p. 193. 1874.

Devonian. Ohio.

Oriskany, Winchell. Ohio Geol. Surv., vol. ii, pp. 301, 328, 340, 379. 1874.

Devonian. Ohio.

Oriskany sandstone, Broadhead. Mo. Geol. Surv., Rept. 1873–74, p. 27. 1874.

Silurian. Missouri. Included in Upper Silurian.

Oriskany, Hotchkiss. A Geographical and Political Summary of Virginia. p. 22. 1876.

Upper Silurian. Virginia. Exact syn. Meridian. (Formation vii, Rogers.)

Oriskany, Ashburner. Am. Phil. Soc., Proc., vol. xvi, pp. 529, 554. 1877.

Devonian. Appalachian region. Exact syn. Meridian.

Oriskany sandstone, Hitchcock. Geol. of N. H., pt. ii, p. 208. 1877.

Devonian. New Hampshire.

Oriskany, Newberry. Ohio Geol. Surv., vol. iii, p. 9. 1878.
Devonian. Ohio.

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Carboniferous. Kansas.

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Upper Carboniferous. Kansas. Included in Henrietta and Des Moines of Missouri.

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Canada.

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Juratrias. Virginia. Included in Chesterfield group. Exact syn. Araucarioxylon beds.

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Lower Carboniferous. Tennessee and Alabama.

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Oxmoor, Gibson. Ala. Geol. Surv., Rept. on Murphrees Valley, p. 22. 1893.
Carboniferous. Alabama. Included in Eocarboniferous. Exact syn. Lagrange.

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Cambrian and Silurian. Missouri. Includes First Magnesian limestone, First sandstone, Second Magnesian limestone, Second sandstone, Third Magnesian limestone, Third sandstone, and Fourth Magnesian limestone.

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Cambro-Silurian. Missouri.

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Cambrian. Missouri, Arkansas.

Ozark series, Keyes. Mo. Geol. Surv., vol. iv, pp. 30, 32–37. 1894.
Cambrian. Missouri. Includes First Magnesian limestone, Sacchoroidal sandstone, Second sandstone, Third Magnesian limestone, Third sandstone, Fourth limestone.

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Cambrian. Missouri.

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Pleistocene. Alabama.

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Cambro-Silurian. Missouri.

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Carboniferous. Arkansas. Included in Sebastian stage.

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Silurian. Missouri. Includes First Magnesian limestone, First sandstone, Second *Magnesian* limestone, Second sandstone, and Third Magnesian limestone.

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Pleistocene. Pennsylvania.

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Algonkian. Texas. Included in Texas system.

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Carboniferous. Montana. Included in Madison group.

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Carboniferous. Texas. Included in Albany division.

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Tertiary. Texas. Exact syn. Goodnight beds.

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Cretaceous. Texas. Included in Trinity division.

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Cretaceous. Texas.

Paluxy stage, Dumble. Geol. Soc. Am., Bull., vol. vi, p. 378. 1895.
Cretaceous. Texas. Included in Lower Cretaceous.

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Tertiary. Virginia and Maryland. Included in Eocene.

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Tertiary. Coastal Plain.

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Tertiary. Maryland, District of Columbia.

Pamunkey, Williams and Clark. Maryland; Its Resources, Industries and Institutions, pp. 77–80. 1893.
Tertiary. Maryland. Included in Eocene.

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Included in Eocene. Virginia and Maryland.

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Eocene. Virginia and Maryland. Includes Aquia Creek and Woodstock stages.

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Tertiary. Maryland. Included in Eocene. Includes Aquia Creek stage, Woodstock stage.

Pamunkey formation, Dall. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, p. 346. 1898.
Tertiary. Maryland, Virginia. Included in Eocene.

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Devonian. Pennsylvania and New York.

Panama conglomerate, Carll. 2d Pa. Geol. Surv., Rept. I^4, pp. 195–203. 1883.
Carboniferous. Pennsylvania.

Panama conglomerate, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, pp. 1519–1529. 1892.
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Tertiary. Utah. Included in Miocene.

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Trinidad.

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Cambrian. Montana.

Parks Mountain bed, Drake. Texas Geol. Surv., 4th Ann. Rept., p. 410. 1893.
Carboniferous. Texas. Included in Cisco division.

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Upper Carboniferous. Missouri. Included in Upper Coal Measures.

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Carboniferous. Mississippi Valley. Included in Missourian series.

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Carboniferous. Mississippi Valley. Included in Coal Measures.

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Carboniferous. Michigan.

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Devonian. Colorado.

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Tertiary. Alabama. Included in Grand Gulf.

Pascagoula, Smith, Johnson and Langdon. Ala. Geol. Surv., Geol. of Coastal Plain of Ala., p. 91. 1894.
Tertiary. Alabama. Included in Miocene.

Pascagoula clays, Dall and Stanley-Brown. Geol. Soc. Am., Bull., vol. v, p. 167. 1894.
Tertiary. Florida.

Paskapoo series, Tyrrell. Can. Geol. Surv., new ser., vol. ii, pp. 74E, 84E, 127E, 135E–137E. 1887.
Canada. Included in Laramie. Includes Porcupine Hills series, Willow Creek series, and greater part of St. Marys River series of Dawson.

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Tertiary. California. Included in late Miocene.

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Cretaceous. Maryland.

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Cretaceous. Maryland. Included in Potomac group.

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Patuxent group, Heilprin. Phil. Acad. Nat. Sci., Proc., vol. xxxii, p. 23. 1880.
Tertiary. Maryland.

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Juratrias. Maryland.

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Jurassic. Maryland. Included in Potomac group, Upper Jurassic.

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Devonian. Pennsylvania. Included in Catskill.

Paupack sandstone, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, p. 158. 1892.
Devonian. Pennsylvania. Included in Catskill, No. ix.

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Cretaceous. Indian Territory. Included in Washita division. Denison beds.

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Carboniferous. Kansas.

Pawnee limestone, Haworth. Am. Jour. Sci., 3d ser., vol. l, p. 457. 1895.
Carboniferous. Kansas. Included in Coal Measures.

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Carboniferous. Kansas.

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Carboniferous. Kansas.

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Carboniferous. Kansas. Included in Marmaton formation.

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Carboniferous. Rhode Island. Included in Cranston beds of Coal Measures.

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Included in Neocene. Idaho.

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Tertiary. *Idaho. Included in Miocene.*

Payette formation, Knowlton. U. S. Geol. Surv., 18th Ann. Rept., pt. iii, pp. 721–736. 1898.
Tertiary. Idaho. Included in Upper Miocene.

Payette formation, Lindgren. U. S. Geol. Surv., 20th Ann. Rept., pt. iii, pp. 97–98. 1900.
Tertiary. Idaho. Included in Miocene.

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Tertiary. Florida. Included in Pliocene.

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Tertiary. Florida. Included in Pliocene.

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Cretaceous. Canada. Included in Colorado group.

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Silurian. Pennsylvania.

Peach Bottom slate, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. i, pp. 137–141. 1892.
Cambrian. Pennsylvania.

Peach Bottom slate, Clark. Md. Geol. Surv., vol. ii, p. 215. 1898.
Maryland.

Pearl River series, Hitchcock. Geol. Soc. Am., Bull., vol. xi, pp. 31–34. 1900.
Tertiary. Hawaiian Islands. Included in Pliocene.

Pearlette ash, Cragin. Colo. Coll. Stud., vol. vi, p. 54. 1896.
Tertiary. Kansas. Included in Tule division of Cummins (Equus beds of Cope). Part. syn. Huerfano Park beds of R. C. Hills.

Pedee bed, Ruffin. Agric. Surv. of S. C., 1843, p. 7. 1843.
Cretaceous. South Carolina.

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Lower Silurian. Alabama. Included in Trenton. Includes Nashville.

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Cretaceous. Colorado.

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Cretaceous. Colorado.

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Tertiary. Wyoming. Included in Eocene.

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Arkansas.

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Carboniferous. Virginia and West Virginia. Included in Coal-bearing strata, Pottsville series.

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Pre-Cambrian. New Jersey.

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Carboniferous. Pennsylvania. Exact syn. Vespertine.

Pocono, Stevenson. 2d Pa. Geol. Surv., Rept. K^3, pp. 54–57. 1878.
Carboniferous. Pennsylvania. Exact syn. Vespertine.

Pocono, Ashburner. 2d. Pa. Geol. Surv., Rept. R, pp. 64–71. 1880.
Carboniferous. Pennsylvania. Includes Sub-Olean conglomerate, Marvin Creek limestone. Exact syn. No. 10, Vespertine.

Pocono, Chance. 2d Pa. Geol. Surv., Rept. G^4, pp. 97–101. 1880.
Carboniferous. Pennsylvania. Exact syn. No. 10, Vespertine.

Pocono, White. 2d Pa. Geol. Surv., Rept. G^5, pp. 56–59. 1881.
Carboniferous. Pennsylvania. Includes Griswold Gap conglomerate, Mount Pleasant conglomerate. Exact syn. No. 10.

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Carboniferous. Pennsylvania. Exact syn. No. 10.
Pocono, White. 2d Pa. Geol. Surv., Rept. G^6, pp. 89-91. 1882.
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Cambrian. Texas.

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Wisconsin.

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Wisconsin.

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Cambrian. New York. Exact syn. Olenellus or Georgia slates of Vermont, Olenellus limestones, and Labrador.

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Cambrian. Virginia.

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Cambrian. Pennsylvania. Exact syn. No. 1.

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Cambrian and Lower Silurian. Virginia. Exact syns. Primal, Formation No. i, Rogers.

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Lower Silurian. Wisconsin. Includes Madison sandstone and Mendota limestone.

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Pennsylvania. Exact syn. No. 1.

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Cambrian. Utah.

Potsdam sandstone, Prime. Am. Jour. Sci., 3d ser., vol. xv, p. 262. 1878.
Cambrian. Pennsylvania.

Potsdam, Prime. 2d Pa. Geol. Surv., Rept. D^2, pp. 7–10. 1878.
Cambrian. Pennsylvania. Exact syn. No. 1.

Potsdam, Endlich. U. S. Geol. and Geog. Surv. of Terr., 11th Ann. Rept., pp. 70, 101, 118. 1879.
Silurian. Wyoming.

Potsdam sandstone, Wadsworth. Harvard Coll. Mus. Comp. Zool., Bull., vol. vii, 1880–884, p. 60. 1880.

Potsdam sandstone, Newton. Geol. of Black Hills, pp. 80–107. 1880.
Cambrian. South Dakota.

Potsdam sandstone, Strong. Geol. of Wis., vol. iii, pp. 395–397. 1880.
Cambrian. Wisconsin. Includes Madison sandstone and Mendota limestone.

Potsdam sandstone, Whittlesey. Geol. of Wis., vol. iii, p. 220. 1880.
Cambrian. Wisconsin.

Potsdam, Hall. 2d Pa. Geol. Surv., Rept. C^6, pp. 38–46. 1881.
Cambrian. Pennsylvania. Exact syn. Rogers's Primal.

Potsdam group, Miller. Cin. Soc. Nat. Hist., Jour., vol. iv, no. iv, p. 267. 1881.
Ordovician.

Potsdam, Platt. 2d Pa. Geol. Surv., Rept. T, p. 51. 1881.
Cambrian. Pennsylvania.

Potsdam sandstone, Winchell. Minn. Geol. and Nat. Hist. Surv., 10th Ann. Rept., pp. 123–136. 1882.
Minnesota.

Potsdam sandstone, Wooster. Geol. of Wis., vol. iv, pp. 109–123. 1882.
Cambrian, Wisconsin

Potsdam sandstone, Strong. Geol. of Wis., vol. iv, pp. 38–64. 1882.
Cambrian. Wisconsin

Potsdam, Selwyn. Science, vol. i, p. 11. 1883.
Cambrian. Canada.

Potsdam, Lesley. 2d Pa. Geol. Surv., Rept. C^4, pp. 144–160. 1883.
Cambrian. Pennsylvania. Exact syn. Primal slate of Rogers.

Potsdam, D'Invilliers. 2d Pa. Geol. Surv., Rept. D^3, pt. ii, pp. 99–136. 1883.
Cambrian. Pennsylvania. Exact syn. No. 1.

Potsdam, Prime. 2d Pa. Geol. Surv., Rept. D^3, pt. i, pp. 205–214. 1883.
Cambrian. Pennsylvania. Exact syn. No. 1.

Potsdam, Chamberlin. Geol. of Wis., vol. i, p. 119. 1883.
Cambrian. Wisconsin.

Potsdam quartzite, Winchell. Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. i, p. 537. 1884.
Minnesota.

Potsdam quartzite, Upham. Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. i, p. 572. 1884.
Minnesota.

Potsdam group, Campbell. The Virginias, vol. vi, p. 99. 1885.
Cambrian. Virginia.

Potsdam group, Campbell. Am. Jour. Sci., 3d ser., vol. xxix, pp. 470–474. 1885.
Cambrian. Virginia.

Potsdam, Dwight. Am. Jour. Sci., 3d ser., vol. xxxi, pp. 125–132. 1886.
Cambrian. New York.

Potsdam, Dwight. Am. Assoc. Adv. Sci., Proc., vol. xxxiv, p. 204. 1886.

Cambrian. New York.

Potsdam sandstone, Upham. Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. ii, pp. 117, 157. 1888.

Cambrian. Minnesota.

Potsdamic, Hitchcock. Boston Soc. Nat. Hist., Proc., vol. xxiv, 1888–90, p. 37. 1888.

Potsdam group, Miller. N. A. Geol. and Pal., p. 29. 1889.

Potsdam, Winchell. Minn. Geol. and Nat. Hist. Surv., 17th Ann. Rept., pp. 49–56. 1889.

Minnesota.

Potsdam sandstone, Hall. Minn. Acad. Nat. Sci., Bull., vol. iii, p. 135. 1889.

Cambrian. Minnesota.

Potsdam, Walcott. U. S. Geol. Surv., Bull. No. 87, pp. 113, 180, 202, 214, 217, 244. 1891.

Cambrian. Lake Superior, Rocky Mts., Texas, Appalachian region. Included in Upper Cambrian.

Potsdam sandstone, McGee. U. S. Geol. Surv., 11th Ann. Rept., pt. i, p. 333. 1891.

Cambrian. Iowa.

Potsdam sandstone, Hall and Sardeson. Geol. Soc. Am., Bull., vol. iii, p. 335. 1892.

Cambrian. Minnesota. Included in Upper Cambrian.

Potsdam, Prosser. Geol. Soc. Am., Bull., vol. iv, pp. 108, 110. 1893.

Cambrian. New York.

Potsdam sandstone, Darton. N. Y. State Geol., 13th Ann. Rept., pp. 410–417. 1894.

Cambrian. New York.

Potsdam sandstone, Cushing. N. Y. State Geol., 13th Ann. Rept., pp. 478–479. 1894.

Cambrian. New York.

Potsdam, Cushing. Geol. Soc. Am., Bull., vol. vi, p. 287. 1895.

Cambrian. New York.

Potsdam, Udden. U. S. Geol. Surv., 17th Ann. Rept., pt. ii, p. 839. 1896.

Cambrian. Illinois.

Potsdam sandstone, Cushing. N. Y. State Geol., 15th Ann. Rept., vol. i, p. 510. 1897.

Cambrian. New York.

Potsdam sandstone, Buckley. Wis. Geol. and Nat. Hist. Surv., Bull. No. 4, Econ. ser., No. ii, pp. 167–248. 1898.

Cambrian. Wisconsin.

Potsdam sandstone, Wadsworth. Am. Inst. Mg. Engrs., Trans., vol. xxvii, p. 683. 1898.

Cambrian. Lake Superior region.

Potsdam formation, Walcott. Geol. Soc. Am., Bull., vol. x, p. 225. 1899.

Cambrian. Wisconsin.

Potsdam sandstone, Salisbury and Atwood. Wis. Geol. and Nat. Hist. Surv., Bull. No. 5, Ed. ser., no. i, pp. 27–31. 1900.

Cambrian. Wisconsin.

Pottawatomie formation, Haworth. Kan. Univ. Geol. Surv., vol. iii, pp. 92–93, 94. 1898.

Carboniferous. Kansas. Included in Upper Coal Measures. Includes Garnett limestones, Lane shales, Iowa limestones, Thayer shales, and Erie limestone.

Potters Clay formation, Rogers. N. J. Geol. Surv., Final Rept., pp. 179–186. 1840.

Cretaceous. New Jersey.

Pottery shale, Wheeler. Mo. Geol. Surv., vol. ix, Sheet Rept., No. 2, p. 65. 1896.

Carboniferous. Missouri. Included in Coal Measures.

Pottstown shale, Lyman. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. ii, pp. 2607–2608. 1895.

Juratrias. Pennsylvania. Included in New Red.

Pottsville conglomerate, Ashburner. Am. Phil. Soc., Proc., vol. xvi, pp. 520, 535. 1877.
Carboniferous. Pennsylvania. Included in Piedmont sandstone, Kanawha River coal series. Exact syns. Seral, Millstone grit.

Pottsville conglomerate, Stevenson. 2d Pa. Geol. Surv., Rept. K^2, pp. 91–95. 1877.
Carboniferous. Pennsylvania. Exact syn. Seral.

Pottsville conglomerate, Platt. 2d Pa. Geol. Surv., Rept. H^2, pp. xxiv–xxvi. 1877.

Pottsville conglomerate, Stevenson. 2d Pa. Geol. Surv., Rept. K^3, pp. 44–46. 1878.
Carboniferous. Pennsylvania. Exact. syn. Seral.

Pottsville conglomerate, Ashburner. 2d Pa. Geol. Surv., Rept. F, pp. 191–194. 1878.
Carboniferous. Pennsylvania. Exact. syn. Seral conglomerate.

Pottsville conglomerate, Chance. 2d Pa. Geol. Surv., Rept. V, pp. 31–34. 1879.
Carboniferous. Pennsylvania. Includes Homewood sandstone, Mercer group, Connoquenessing sandstone. Exact syn. No. 12.

Pottsville, Chance. 2d Pa. Geol. Surv., Rept. V^2, pp. 59–63, 1880.
Carboniferous. Pennsylvania.

Pottsville, Ashburner. 2d Pa. Geol. Surv., Rept. R, pp. 49–62 1880.
Carboniferous. Pennsylvania. Includes Johnson River sandstone, Kinzua Creek sandstone, and Olean conglomerate. Exact syns. Seral, Millstone grit.

Pottsville, White. 2d Pa. Geol. Surv., Rept. Q^4, pp. 55–65. 1881.
Carboniferous. Pennsylvania. Includes Homewood sandstone, Mercer group, Connoquenessing group, and Sharon group. Exact syn. No. 12.

Pottsville conglomerate, White. 2d Pa. Geol. Surv., Rept. G^5, pp. 45–53. 1881.
Carboniferous. Pennsylvania. Exact syn. No. 12.

Pottsville, Platt. 2d Pa. Geol. Surv., Rept. H^6, pp. xxxiii–xxxiv. 1881.
Carboniferous. Pennsylvania. Exact syn. No. 12.

Pottsville, Stevenson. 2d Pa. Geol. Surv., Rept. T^2, pp. 65–67. 1882.
Carboniferous. Pennsylvania.

Pottsville, Carll. 2d Pa. Geol. Surv., Rept. I^4, pp. 185–189. 1883.
Carboniferous. Pennsylvania. Includes Johnsons River rock, Kinzua Creek sandstone, and Olean conglomerate. Exact syn. No 12.

Pottsville, White. 2d Pa. Geol. Surv., Rept. T^3, pp. 69–73. 1885.
Carboniferous. Pennsylvania. Includes Homewood (Johnson River) sandstone, Connoquenessing (Kinzua Creek) sandstones, and Sharon conglomerate.

Pottsville conglomerate, Ashburner. 2d Pa. Geol. Surv., Rept. R^2, p. 399. 1885.
Carboniferous. Pennsylvania. Exact syn. No. 12.

Pottsville conglomerate, Winslow. 2d Pa. Geol. Surv., Ann. Rept., 1886, pt. iv, pp. 1337, 1363. 1887.
Carboniferous. Pennsylvania. Exact syn. No. 12.

Pottsville, Carll. 2d Pa. Geol. Surv., Rept. I^5, pp. 111–112, 126–128. 1890.
Carboniferous. Pennsylvania.

Pottsville conglomerate, White. U. S. Geol. Surv., Bull. No. 65, p. 179. 1891.
Carboniferous. Ohio, Pennsylvania, West Virginia. Included in Homewood sandstone, Mercer group, Connoquenessing sandstone, New River Coal group, and Sharon conglomerate.

Pottsville conglomerate, White. Geol. Soc. Am., Bull., vol. iii, p. 190. 1892.
Upper Carboniferous. West Virginia.

Pottsville, Williams and Clark. Maryland. Its Resources, Industries, and Institutions, p. 72. 1893.
Carboniferous. Maryland. Part. syn. No. xii.

Pottsville conglomerate, Smith. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. i, pp. 1853–1855, 1949–1951 et seq. 1895.
Carboniferous. Pennsylvania. Exact syn. No. xii.

Pottsville conglomerate, D'Invilliers. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. i, pp. 1857–1915. 1895.
Carboniferous. Pennsylvania. Includes Homewood or Johnson River sandstone, Connoquenessing or Kinzua sandstone, and Sharon, Olean, or Garland conglomerate. Exact syn. No. 12, Seral conglomerate of Rogers.

Pottsville formation, Clark. Md. Geol. Surv., vol. i, pp. 156, 185–186. 1897.
Carboniferous. Maryland. Exact syn. Blackwater formation.

Pottsville, Clark. Md. Geol. Surv., vol. ii, p. 208. 1898.
Carboniferous. Maryland. Included in Coal Measures.

Pottsville conglomerate, White. W. Va. Geol. Surv., vol. i, p. 202. 1899.
Carboniferous. West Virginia.

Pottsville, Clark. Md. Geol. Surv., vol. iii, p. 100. 1899.
Carboniferous. Maryland. Included in Coal Measures.

Pottsville formation, White. U. S. Geol. Surv., 20th Ann. Rept., pt. ii, pp. 755–865. 1900.
Carboniferous. Pennsylvania. Includes Clark, Quinnemont, Sewell, and Lookout formations, and Fayette sandstone.

Pottsville formation, O'Harra. Md. Geol. Surv., Allegany County, p. 113. 1900.
Carboniferous. Maryland.

Poughquag limestone and quartzite, Dana. Am. Jour. Sci., 3d ser., vol. iii, pp. 252–253, 255. 1872.
Silurian. New York.

Powelton shale, White. 2d Pa. Geol. Surv., Rept. T^3, pp. 61–62. 1885.
Carboniferous. Pennsylvania.

Poxono Island shale, White. 2d Pa. Geol. Surv., Rept. G^6, pp. 145–147. 1882.
Silurian. Pennsylvania. Included in Upper Helderburg or No. vi.

Poxono Island shale and limestone, Lesley. 2d Pa. Geol. Surv., Final Rept., vol. ii, pp. 934–935. 1892.
Silurian. Pennsylvania. Included in No. vi.

Poxono Island shale, Weller. N. J. Geol. Surv., Rept. 1899, pp. 5–6. 1900.
Silurian. New Jersey.

Prairie Bluff limestone, Winchell. Am. Assoc. Adv. Sci., Proc., vol. x, p. 90. 1856.
Cretaceous. Alabama. Included in Upper Cretaceous.

Prairie d'Ane or White Clay till, Hill. Ark. Geol. Surv., 1888, vol. ii, pp. 32–33. 1888.
Post-Tertiary. Arkansas.

Pre-Meridian series, Rogers. Geol. of Pa., vol. i, pp. 107, 136–137, 272 et seq., vol. ii, p. 754. 1858.
Silurian. Pennsylvania. Exact. syn. Lower Helderberg.

Preston beds, Hill. Geol. Soc. Am., Bull., vol. v, p. 302. 1894.
Cretaceous. Texas. Included in Washita division. Includes Duck Creek and Kiamitia.

Price sandstone, Campbell. Geol. Soc. Am., Bull., vol. v, pp. 171, 177. 1894.
Lower Carboniferous. Virginia. Included in Pocono.

Price, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 26. 1896.
Carboniferous. Virginia and West Virginia.

Price sandstone, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 44. 1897.
Carboniferous. Virginia and West Virginia. Exact syn. No. x, Montgomery grits.

Primal series, Rogers. Am. Jour. Sci., 1st ser., vol. xlvii, p. 155. 1844.

Primal series, Rogers. Geol. of Pa., vol. i, pp. 104, 122–123, 150–207 et seq., vol. ii, p. 751. 1858.
Cambrian. Pennsylvania. Part. syn. Potsdam.

Primal, Walcott. U. S. Geol. Surv., Bull. No. 81, pp. 128, 251, 288. 1891.
Cambrian. Appalachian region.

Primedidial series, Rogers. Am. Jour. Sci., 1st ser., vol. xlvii, p. 155. 1844.
Silurian. Includes Pentamerus and Catskill shaly limestone and Oriskany limestone.

Princeton conglomerate, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 26. 1896.
Carboniferous. Virginia and West Virginia.

Princeton conglomerate, Campbell and Mendenhall. U. S. Geol. Surv., 17th Ann. Rept., pt. ii, p. 489. 1896.
Carboniferous. West Virginia. Included in No. xii of Rogers, Conglomerate series of Fontaine.

Princeton conglomerate, Campbell. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 44. 1897.
Carboniferous. Virginia and West Virginia. Part. syns. No. xi, Greenbrier shale Rogers.

Procamelus beds, Cope. U. S. Geol. and Geog. Surv. of Terr., vol. v, pp. 51–52. 1879.
Tertiary. Included in Loup Fork.

Proctor limestone, Keyes. Mo. Geol. Surv., vol. vi, p. 331. 1894.
Cambrian. Missouri. Included in Gasconade limestone, Ozark series.

Productal limestone, Owen. Geol. Reconn. State of Indiana, Rept. in 1837, p. 22. 1839.
Indiana. Included in Subcarboniferous limestone.

Productive coal measures, Upper and Lower, Rogers. Geol. of Pa., vol. 1, p. 109. 1858.
Carboniferous. Pennsylvania. Included in Seral series.

Productive measures, Upper. Stevenson. 2d Pa. Geol. Surv., Rept. K. pp. 57–74, 84–88. 1876.
Carboniferous. Pennsylvania. Includes Waynesburg sandstone. Great limestone, Fishpot limestone, and Pittsburg sandstone.

Productive series, Upper. Stevenson. 2d Pa. Geol. Surv., Rept. K². pp. 30–63. 1877.
Carboniferous. Pennsylvania. Includes Waynesburg sandstone and limestone. Great limestone, Fishpot limestone, and Redstone limestone.

Productive series, Lower. Stevenson. 2d Pa. Geol. Surv., Rept. K³. pp. 73–90. 1877.
Carboniferous. Pennsylvania and West Virginia. Includes Mahoning sandstone Freeport limestone, and Piedmont sandstone = Tionesta.

Productive series, Lower. White. 2d Pa. Geol. Surv., Rept. Q². pp. 27–51. 187
Carboniferous. Pennsylvania. Includes Freeport or Butler sandstone and li stone, Kittanning sandstone, and Ferriferous limestone.

Productive measures, Lower. Ashburner. 2d Pa. Geol. Surv., Rept. F. pp. 184– 1878.
Carboniferous. Pennsylvania. Exact syn. Allegheny River series.

Productive series, Upper. White. 2d Pa. Geol. Surv., Rept. Q. pp. 21–22. 1878
Carboniferous. Pennsylvania.

Productive series, Lower. White. 2d Pa. Geol. Surv., Rept. Q. pp. 30–64. 1878
Carboniferous. Pennsylvania. Includes Freeport limestone, Butler sandst and limestone, Kittanning sandstone, and Ferriferous limestone.

Productive series, Upper. Stevenson. 2d Pa. Geol. Surv., Rept. K¹. pp. 14 1878.
Carboniferous. Pennsylvania.

ductive series, Lower, Stevenson. 2d Pa. Geol. Surv., Rept. K^2, pp. 27–43. 1878.
arboniferous. Pennsylvania. Includes Mahoning sandstone, Freeport limestone and sandstone, Kittanning limestone, Bolivar sandstone, and Clarion sandstone.

ductive measures, Upper, Platt. 2d Pa. Geol. Surv., Rept. H^4, pp. 155–165. 1878.
arboniferous. Pennsylvania.

ductive measures, Lower, Platt. 2d Pa. Geol. Surv., Rept. H^4, pp. 175–231. 1878.
arboniferous. Pennsylvania.

ductive measures, Lower, Chance. 2d Pa. Geol. Surv., Rept. V, pp. 15–29. 1879.
arboniferous. Pennsylvania. Includes Freeport group, Mahoning sandstone, Kittanning group, and Ferriferous limestone.

ductive measures, Lower, White. 2d Pa. Geol. Surv., Rept. Q^3, pp. 22–32. 1880.
arboniferous. Pennsylvania. Includes Ferriferous limestone.

ductive measures, Lower, Ashburner. 2d Pa. Geol. Surv., Rept. R, pp. 45–48. 1880.
arboniferous. Pennsylvania.

ductive measures, Lower, Chance. 2d Pa. Geol. Surv., Rept. V^2, pp. 31–56. 1880.
arboniferous. Pennsylvania. Includes Freeport group, Kittanning group, Johnstown cement limestone, Clarion group, and Ferriferous limestone.

ductive measures, Upper, Platt. 2d Pa. Geol. Surv., Rept. H^5, pp. 43–291. 1880.
arboniferous. Pennsylvania.

ductive measures, Lower, Platt. 2d Pa. Geol. Surv., Rept. H^5, p. 313. 1880.
arboniferous. Pennsylvania.

ductive measures, Lower, Chance. 2d Pa. Geol. Surv., Rept. H^7, pp. 25–80. 1884.
arboniferous. Pennsylvania.

ductive measures, Lower, Ashburner. 2d Pa. Geol. Surv., Rept. R^2, p. 393. 1885.
arboniferous. Pennsylvania.

ductive measures, Upper, D'Invilliers. 2d Pa. Geol. Surv., Ann. Rept., 1885, pp. 171–177. 1886.
arboniferous. Pennsylvania.

ductive measures, Lower, Platt. 2d Pa. Geol. Surv., Rept. H^6, pp. xxix–xxxii. 1887.
arboniferous. Pennsylvania. Included in Freeport group, Kittanning group, and Clarion group.

ductive measures, Upper, D'Invilliers. 2d Pa. Geol. Surv., Ann. Rept., 1886, pp. 63–74, 206–208, 264–265, 291–295, 336–341. 1887.
arboniferous. Pennsylvania. Exact syn. Monongahela River series.

ductive measures, Lower, D'Invilliers. 2d Pa. Geol. Surv., Ann. Rept., 1886, pp. 79–81. 1887.
arboniferous. Pennsylvania. Exact syn. Allegheny River series.

ductive measures, Upper, Carll. 2d Pa. Geol. Surv., Rept. I^5, pp. 122–123. 1890.
arboniferous. Pennsylvania. Exact syn. Monongahela series.

ductive measures, Lower, Carll. 2d Pa. Geol. Surv., Rept. I^5, pp. 125–126. 1890.
arboniferous. Pennsylvania. Exact syn. Allegheny series.

ductive group, Squire. Ala. Geol. Surv., Rept. on Cahaba coal field, p. 14 et seq. 1890.
arboniferous. Alabama. Included in Coal Measures.

ductive series, Upper, D'Invilliers. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. ii, pp. 2448–2564. 1895.
arboniferous. Pennsylvania. Exact syns. No. xv, Monongahela River series.

ductive measures, Lower, D'Invilliers. 2d Pa. Geol. Surv., Final Rept., vol. iii, pt. ii, pp. 2155–2405. 1895.
arboniferous. Pennsylvania. Exact syns. No. xiii, Allegheny River series.

Prospect Mountain limestone and quartzite, Hague. U. S. Geol. Surv., 3d Ann. Rept., pp. 253, 254. 1883.
Cambrian. Nevada.

Prospect, Walcott. U. S. Geol. Surv., Bull. No. 81, pp. 252, 313. 1891.
Cambrian. Nevada.

Prospect Mountain limestone, Hague. U. S. Geol. Surv., Mon., vol. xx, p. 36. 1892.
Cambrian. Nevada.

Prospect Mountain quartzite, Hague. U. S. Geol. Surv., Mon., vol. xx, p. 35. 1892.
Cambrian. Nevada.

Proteau group, Vanuxem. N. Y. Geol. Surv., 4th Ann. Rept., pp. 374–375. 1840.
Silurian. New York.

Proteau group, Hall. Am. Jour. Sci., 1st ser., vol. xlii, p. 60. 1842.
New York and Ohio.

Protoceras beds, Wortman. Am. Mus. Nat. Hist., Bull., vol. v, 1893, pp. 101–102. 1893.
Lower Miocene. South Dakota. Included in White River sediments. Includes Uppermost strata of Oreodon beds.

Protoceras, Wortman. Am. Mus. Nat. Hist., Bull., vol. v, pp. 96, 101. 1893.
Tertiary. Included in White River or Lower Miocene.

Pteranodon beds, Marsh. U. S. Geol. Surv., Mon., vol. xxvii, p. 476. 1896.
Cretaceous. Colorado.

Pteranodon beds, Logan. Jour. of Geol., vol. vii, pp. 90–91. 1899.
Cretaceous. Kansas and Nebraska. Included in Niobrara. Exact syns. Apishapa and Upper Timber beds.

Puckwunge conglomerate, Winchell. Am. Geol., vol. xx, pp. 50–51. 1897.
Algonkian. Minnesota.

Puckwunge conglomerate, Winchell. Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iv. pp. 13, 517. 1899.
Cambrian. Minnesota. Included in Keweenawan.

Puckwunge conglomerate, Winchell. Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. v, p. 54. 1900.
Cambrian. Minnesota.

Puerco marl, Cope. Rept. of Secy. of War to 44th Cong., vol. ii, pt. ii, p. 1012. 1875.
Tertiary. New Mexico. Included in Eocene.

Puerco marl, Holmes. U. S. Geol. and Geog. Surv. of Terr., 9th Ann. Rept., p. 248. 1877.
Cretaceous. Colorado. Exact syn. Bad Land group.

Puerco marl, Endlich. U. S. Geol. and Geog. Surv. of Terr., 10th Ann. Rept., p. 123. 1878.
Tertiary. Colorado. Included in Wahsatch group.

Puerco, Cope. U. S. Geol. and Geog. Surv. of Terr., Mon., vol. iii, pp. 3–6. 1881.
Tertiary.

Puerco, Clark. U. S. Geol. Surv., Bull. No. 83, p. 137. 1891.
Tertiary. Colorado and New Mexico.

Puerco beds, Osborn and Earle. Am. Mus. Nat. Hist., Bull., vol. vii, 1895, pp. 1–3. 1895.
New Mexico. Included in Basal Eocene.

Puerco beds, Marcou. Am. Geol., vol. xix, pp. 120–121. 1897.
Tertiary.

Puerco, Matthew. Am. Mus. Nat. Hist., Bull., vol. ix, 1897, pp. 259–323. 1897.
Eocene. New Mexico. Included in Basal Eocene.

Puerco beds, Dall. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, p. 347. 1898.
Tertiary. New Mexico and Colorado. Included in Eocene. Part. syn. Torreon *formation.*

Puerco formation, Smith. Jour. of Geol., vol. viii, pp. 448–449. 1900.
Tertiary. Western North America. Included in Eocene.

Puget group, White. Am. Jour. Sci., 3d ser., vol. xxxvi, pp. 443–450. 1888.
Cretaceous. Washington. Exact syn. Laramie.

Puget group, White. U. S. Geol. Surv., Bull. No. 51, pp. 49–63. 1889.
Cretaceous. Washington.

Puget, White. U. S. Geol. Surv., Bull. 51, p. 49, 1889. U. S. Geol. Surv., Bull. No. 82, p. 196. 1891.
Cretaceous. Pacific coast. Included in Upper Cretaceous.

Puget, Clark. U. S. Geol. Surv., Bull. No. 83, p. 107. 1891.
Tertiary. Washington. Included in Eocene. Exact syn. Tejon (?).

Puget group, Dall and Harris. U. S. Geol. Surv., Bull. No. 84, p. 229. 1892.
Tertiary. Washington.

Puget group, Kimball. Am. Geol., vol. xix, pp. 305–306. 1897.
Cretaceous or Eocene. Washington.

Puget group (epoch), Willis. Geol. Soc. Am., Bull., vol. ix, p. 2. 1897.
Tertiary. Washington. Part. syn. Tejon.

Puget group, Dall. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, p. 347. 1898.
Tertiary. Washington. Included in Eocene.

Puget formation, Willis. U. S. Geol. Surv., 18th Ann. Rept., pt. iii, pp. 400–412. 1898.
Tertiary. Washington.

Puget formation, Willis and Smith. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 54. 1899.
Tertiary. Washington. Included in Eocene.

Puget formation, Smith. Jour. of Geol., vol. viii, pp. 457–459. 1900.
Tertiary. Washington. Included in Eocene.

Pugh, Taff and Brooks. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 34. 1896.
Carboniferous. West Virginia.

Pulaski shales, Vanuxem. N. Y. Geol. Surv., 4th Ann. Rept., pp. 373–374. 1840.
New York.

Pulaski shale, Vanuxem. Geol. of N. Y., pt. iii, p. 64. 1842.
Paleozoic. New York. Included in Hudson River group.

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erous. Iowa. Included in Mississippian series.
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arboniferous. Missouri. Includes St. Genevieve sandstone, St. Louis
stone, and Warsaw (in part).
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Warsaw (in part).
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Cambrian. New York.

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Silurian. Tennessee. Exact syns. Lower Trenton and Black River group.

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Cambrian. Massachusetts.

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Carboniferous. Texas. Included in Coal Measures.

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Carboniferous. Texas. Includes Ricker, Antelope Creek, Indian Creek, Comanche Creek, Wilbarger Creek, Buffalo Creek, Rough Creek, Hanna Valley, Cottonwood Creek, Spring Creek, Brown Creek, Big Valley, Bull Creek, Horse Creek, Fox Ford, Bed No. VIII, Shadrick Mill, Elliott Creek, Burnt Branch, and Lynch Creek beds.

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Tertiary and Pleistocene. California.

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Silurian. Pennsylvania. Includes Clinton group.

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New Hampshire.

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Paleozoic. New Hampshire.

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Carboniferous. Arkansas. Included in Upper Devonian.

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New York.

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Vermont.

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New York, Massachusetts.

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Minnesota. Exact syns. Animike and Huronian.

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Minnesota. Exact syn. Animike.

Taconic, Walcott. U. S. Geol. Surv., Bull. No. 81, p. 242. 1891.
Cambrian.

Taconian, Pumpelly. Geol. Soc. Am., Bull., vol. iv, p. 383. 1893.
Archean(?). Canada(?).

Taconic, Nitze and Hanna. N. C. Geol. Surv., Bull. No. 3, pp. 28–32, 43. 1896.
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Cambrian. Minnesota. Included in Animikie.

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Alaska.

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Tertiary. Georgia, Alabama. Included in Claibornian stage, Eocene. Exact syns. Orangeburg formation, Buhrstone.

Taloga formation, Cragin. Am. Geol., vol. xix, pp. 362–363. 1897.
Permian. Kansas, Oklahoma. Included in Kiger division of Cimarron series.

Talpa bed, Drake. Texas Geol. Surv., 4th Ann. Rept., p. 428. 1893.
Carboniferous. Texas. Included in Albany division.

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Tertiary. Trinidad. Included in Newer Parian group.

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Tampa limestone, Dall and Harris. U. S. Geol. Surv., Bull. No. 84, p. 117. 1892.
Tertiary. Florida. Included in Miocene.

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Tertiary. Florida. Included in Chattahooche.

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Alaska. Included in Nasina series.

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Pre-Silurian. Alaska.

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Carboniferous. Kentucky. Included in Subcarboniferous.

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Trenton limestone, Broadhead. Mo. Geol. Surv., Rept. 1855–1871, p. 49. 1873.
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Lower Silurian. Wisconsin.
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Silurian. Pennsylvania.

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Lower Silurian. Minnesota.

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Silurian. Iowa.

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Silurian. Alabama. Exact syn. Pelham.

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Silurian. Maryland.

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Trinity division, Hill. Artesian Invest., Final Rept., pt. iii, p. 81, 52d Cong., 1st Sess., Ex. Doc. 41, pt. iii. 1892.
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Cretaceous. Texas.

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Cretaceous. Texas. Includes Glen Rose.

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Cretaceous. Texas.

Trinity division, Dumble. Geol. Soc. Am., Bull., vol. vi, p. 378. 1895.
Cretaceous. Texas. Included in Lower Cretaceous.

Trough Creek limestone, White. 2d Pa. Geol. Surv., Rept. T^3, pp. 73–76. 1885.
Carboniferous. Pennsylvania.

Truckee group, King. U. S. Geol. Expl. of 40th Parallel, vol. i, p. 412. 1878
Tertiary. Nevada. Included in Miocene.

Truckee group, White. U. S. Nat. Mus., Proc., vol. v, pp. 99–102. 1882.
Tertiary. California. Included in Miocene. Part. syn. Miocene(?).

Truckee group, Dall and Harris. U. S. Geol. Surv., Bull. No. 84, pp. 282, 285, 313. 1892.
Tertiary. Idaho, Oregon, Nevada. Exact syn. Idaho group.

Truro series, Shaler. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, pp. 541–548. 1898.
Pleistocene. Massachusetts. Included in Glacial, Cape Cod series.

Tuckahoe group, Shaler and Woodworth. U. S. Geol. Surv., 19th Ann. Rept., pt. ii, pp. 423–435. 1899.
Juratrias. Virginia. Included in Newark. Includes Boscabel bowlder beds.

Tucumcari beds, Cummins. Texas Geol. Surv., 3d Ann. Rept., pp. 201–210. 1892.
Cretaceous and Tertiary. Texas.

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Cretaceous. Kansas. Included in Belvidere beds.

Tule division, Cummins. Texas Geol. Surv., 4th Ann. Rept., pp. 199–200. 1893.
Tertiary. Texas.

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Silurian. Maryland. Exact syn. White Medina sandstone.

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Silurian. Maryland. Part. syn. White Medina.

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Silurian. Pennsylvania.

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Silurian. Pennsylvania. Included in No. iii.

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Ordovician.

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Silurian. Pennsylvania.

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Silurian. New York. Exact syns. Mohawk slate, Black slate and shale, Frankfort slate, Lorraine shales. Part. syns. Eaton's Transition argillite, Wacke slate, Glazed slate, and Matinal black slate of Pennsylvania Survey.

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Silurian. New York.

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Virginia. Exact syn. Formation II.

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Archean. Texas. Included in Fernandan system.

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Trias. British Columbia. Part syn. Nicola formation.

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Missouri. Included in Chemung.

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Carboniferous. Missouri. Included in Lower Carboniferous.

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Lower Carboniferous. Missouri. Included in Chouteau group.

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Lower Carboniferous. Missouri. Exact syn. Hannibal shales.

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Lower Carboniferous. Missouri. Included in Mississippian. Exact syn. Hannibal limestone.

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Utah.

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Utah.

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Tertiary. Utah.

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Carboniferous.

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Mississippi. Includes Upper Eocene.

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Eocene. Mississippi.

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Eocene. Mississippi. Includes Vicksburg (proper) crystalline limestone and blue marls, Ferruginous rocks of Red Bluff.

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Tertiary. Mississippi, Louisiana. Included in Eocene, White limestone.

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Tertiary. Gulf States.

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Cretaceous. Kansas. Included in Benton.

Victoria shales, Adams. Kan. Univ. Geol. Surv., vol. iv, pp. 25–26. 1898.
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Juratrias. Virginia. Included in Chesterfield group. Exact syn. Estheria beds.

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Algonkian. Colorado.

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Algonkian (?). Grand Canyon series.

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Carboniferous. Nebraska.

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Tertiary. South Carolina. Included in Pliocene.

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Tertiary.

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Post-Cretaceous.

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Carboniferous. Utah.

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Tertiary. Wyoming.

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Tertiary. Wyoming.

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Tertiary. New Mexico.

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Tertiary. Utah. Included in Eocene.

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Carboniferous. Alabama. Included in Coal Measures.

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Carboniferous. Texas. Included in Cisco division.

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Indiana.

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Cretaceous. California.

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Cretaceous. Mexico.

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Cretaceous. Texas. Included in Fredericksburg division.

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Cretaceous. Texas. Included in Trinity division.

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Cretaceous. Texas. Included in Fredericksburg division of Comanche series.

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Cambrian. Minnesota. Included in Animikie.

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Silurian. New York.

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Silurian. New York. Exact syn. Barnegat.

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Cambrian and Silurian. New York.

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Cambrian. New York.

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Devonian. Iowa. Includes Upper and Lower Davenport, Kenwood, and Otis.

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Devonian. Iowa. Includes Independence and Davenport.

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Indiana.

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Pleistocene. Included in Champlain epoch.

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Upper Carboniferous. Missouri. Included in Missourian series.

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Carboniferous. Mississippi Valley. Exact syn. Second Archimides.

Warsaw limestone, Shumard. St. Louis Acad. Sci., Trans., vol. i, p. 407. 1857.

Lower Carboniferous. Missouri. Included in Mountain limestone. Exact syn. Second Archimides limestone.

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Carboniferous. Iowa. Exact syn. Second Archimides limestone.

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Carboniferous. Iowa.

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Carboniferous. Mississippi Valley. Exact syns. Second Archimides limestone, Magnesian limestone.

Warsaw limestone, Engelmann. St. Louis Acad. Sci., Trans., vol. ii, p. 189. 1868.

Lower Carboniferous. Illinois.

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Carboniferous. Illinois. Included in St. Louis limestone.

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Carboniferous. Missouri. Included in St. Louis group.

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Carboniferous.

Warsaw limestone, Hopkins. Ark. Geol. Surv., 1890, vol. iv, p. 55. 1890.

Carboniferous. Arkansas. Included in Lower Carboniferous. Exact syn. St. Louis.

Warsaw, Keyes. Geol. Soc. Am., Bull., vol. iii, pp. 286, 293, 298. 1892.

Lower Carboniferous. Missouri. Included in St. Louis and Osage groups.

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Lower Carboniferous. Missouri. Included in Augusta stage (part).

Warsaw, Keyes. Mo. Geol. Surv., vol. vii, pt. ii, p. 390. 1894.

Lower Carboniferous. Missouri. Included partly in St. Louis stage, partly in Augusta stage.

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Carboniferous. Iowa.

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Carboniferous. Iowa.

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Tertiary. Rocky Mountains.

Washakie beds, Dall and Harris. U. S. Geol. Surv., Bull. No. 84, p. 337. 1892.

Tertiary. Wyoming.

Washburn sandstone, Stevenson. N. Y. Geol. Acad. Sci., Trans., vol. xv, p. 51. 1896.

Carboniferous. Arkansas. Included in Appleton stage.

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Carboniferous. Tennessee. Part. syn. Walden sandstone.

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Carboniferous. Tennessee. Part. syn. Walden sandstone.

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Carboniferous. Pennsylvania. Included in Upper Barren Measures.

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Carboniferous. Pennsylvania. Included in Upper Barren Measures.

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Carboniferous. Arkansas. Included in Lower Carboniferous.

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Cretaceous. Arkansas. Included in Upper Arenaceous beds.

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Carboniferous. Pennsylvania, West Virginia. Included in Permo-Carboniferous, Dunkard Creek.

Washington limestone, White. U. S. Geol. Surv., Bull. No. 65, pp. 35–36. 1891.

Carboniferous. Pennsylvania and West Virginia. Included in Permo-Carboniferous, Dunkard Creek. Includes Upper, Middle, and Lower Washington limestones.

Washington gneiss, Emerson. U. S. Geol. Surv., Geol. Atlas of U. S., Hawley sheet. 1892.

Algonkian. Massachusetts. Part. syn. Stamford gneiss.

Washington, Hill. Geol. Soc. Am., Bull., vol. v, p. 302. 1894.

Cretaceous. Texas. Included in Glanconitic division.

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Carboniferous. Indian Territory. Included in Boston group of Lower Cretaceous.

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Pre-Cambrian. Massachusetts.

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Algonkian. Massachusetts.

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Silurian. Vermont. Included in Trenton.

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Pre-Cambrian. Massachusetts.

Washita limestone, Shumard. St. Louis Acad. Sci., Trans., vol. i, pp. 583, 586. 1857.

Cretaceous. Texas.

Washita limestone, Marcou. Boston Soc. Nat. Hist., Proc., vol. viii, 1861–62, p. 89. 1861.

Cretaceous. Texas. Included in Upper Cretaceous (Lower Cretaceous, according *to Marcou*).

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Cretaceous. Texas. Included in Comanche series.

Washita division, Hill. Ark. Geol. Surv., 1888, vol. ii, pp. 111–113, 179–180. 1888.
Cretaceous. Arkansas. Included in Lower Cretaceous or Comanche series.

Washita division, Dumble. Texas Geol. Surv., 1st Ann. Rept., pl. iii, pp. i–li. 1890.
Cretaceous. Texas. Included in Comanche series.

Washita division, Hill. Texas Geol. Surv., 1st Ann. Rept., pp. 126–130. 1890.
Cretaceous. Texas. Included in Comanche series. Includes Shoal Creek limestone, Exogyra Arietna clay, Washita or Fort Worth limestone, Caprotina beds.

Washita division, Taff. Texas Geol. Surv., 2d Ann. Rept., pp. 719–732. 1891.
Cretaceous. Texas. Included in Lower Cretaceous. Includes Caprotina, Arietna, Malone, Etholen, Yucca Bluff, Quitman, and Mountain beds.

Washita division, Hill. Geol. Soc. Am., Bull., vol. ii, pp. 503, 515–518. 1891.
Cretaceous. Texas. Includes Denison beds, Fort Worth limestone, Duck Creek limestone, and Kiamitia clays.

Washita division, Hill. Artesian Invest., Final Rept., pt. iii, p. 88, 52d Cong., 1st sess., Ex. Doc. 41, pt. iii. 1892.
Cretaceous. Southwest. Includes Denison beds. Exact syn. Indian Territory division.

Washita division, Taff. Texas Geol. Surv., 3d Ann. Rept., pp. 276–277. 1892.
Cretaceous. Texas. Includes Vola limestone, Arietna clay, Denison, and Fort Worth.

Washita, Dumble and Cummins. Am. Geol., vol. xii, p. 310. 1893.
Cretaceous. Texas.

Washita division, Taff. Texas Geol. Surv., 4th Ann. Rept., pp. 262–283. 1893.
Cretaceous. Texas. Included in Lower Cretaceous. Includes Vola limestone, Exogyra Arietina clay, Fort Worth limestone, and Denison marl.

Washita stage, Dumble. Geol. Soc. Am., Bull., vol. vi, p. 377. 1895.
Cretaceous. Texas. Included in Lower Cretaceous.

Wassonville limestone, Bain. Am. Geol., vol. xv, p. 322. 1895.
Carboniferous. Iowa. Included in Mississippian series, Kinderhook.

Wassonville limestone, Bain. Iowa Geol. Surv., vol. v, p. 134. 1896.
Carboniferous. Iowa. Included in Kinderhook.

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New York.

Water lime, Vanuxem. N. Y. Geol. Surv., 3d Ann. Rept., pp. 272–274. 1839.
Silurian. New York.

Water-lime series, Hall. N. Y. Geol. Surv., 3d Ann. Rept., pp. 292, 306. 1839.
Silurian. New York.

Water-lime group, Vanuxem. Geol. of N. Y., pt. iii, pp. 110–116. 1842.
Paleozoic. New York. Included in New York system. Includes Water-lime group, Hydraulic limerock. Part. syn. No. vi, Pennsylvania Survey.

Water-lime group, Mather. Geol. of N. Y., pt. i, pp. 349–352. 1843.
Paleozoic. New York. Included in Helderberg division. Includes Hydraulic limestone, No. vi, Rogers.

Water-lime group, Hall. Geol. of N. Y., pt. iv, 4th Geol. Dist., pp. 18, 141–143. 1843.
Paleozoic. New York. Includes Water-lime group, Water-lime rock (?). Tentaculite limestone.

Water-lime group or (Manlius Water lime), Owen. Am. Jour. Sci., 2d ser., vol. i, p. 47. 1846.
Silurian. New York. Included in Helderberg series of the New York system. Part. syn. part of No. vi, Pennsylvania Survey.

Water lime, Cook. Geol. of N. J., pp. 155–157. 1868.
Silurian. New Jersey.

Vater lime, Winchell. Ohio Geol. Surv., vol. i, pt. i, pp. 599, 617, 632, 642. 1873.
Silurian. Ohio.

Vater lime, Gilbert. Ohio Geol. Surv., vol. i, pt. i, p. 575. 1873.
Silurian. Ohio.

Vater lime, Newberry. Ohio Geol. Surv., vol. i, pt. i, p. 135. 1873.
Silurian. Ohio.

Vater lime, Newberry. Ohio Geol. Surv., vol. ii, p. 193. 1874.
Silurian. Ohio.

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Silurian. Ohio.

Vater lime, Ashburner. Am. Phil. Soc. Proc., vol. xvi, pp. 530, 555. 1877.
Silurian. Appalachian region. Exact syn. Scalent.

Vater lime group, Miller. Cin. Soc. Nat. Hist., Jour., vol. iv, No. 4, p. 274. 1881.

Vater lime group, Tiffany. Sci., vol. ii, p. 323. 1883.
Silurian. Iowa.

Vater lime, Tiffany. Am. Assoc. Adv. Sci., Proc., vol. xxxii, p. 246. 1884.
Silurian. Iowa.

Vater lime group, Hopkins. Ark. Geol. Surv., 1890, vol. iv, p. 52. 1890.
Silurian. Arkansas. Included in Silurian group. Part syn. Lower Helderberg.

Vater lime formation, Luther. N. Y. State Geol., 16th Ann. Rept., p. 211. 1899.
Silurian. New York.

Vaterloo quartzite, Chamberlin. Geol. of Wis., vol. ii, pp. 252-256. 1877.
Archean. Wisconsin.

Vaterville slates, Hitchcock. Rept. on Geol. of Maine, 1861, p. 232. 1861.
Lower Silurian.

Vatts Creek bed, Drake. Texas Geol. Surv., 4th Ann. Rept., p. 419. 1893.
Carboniferous. Texas. Included in Cisco division.

Waukesha beds, Chamberlin. Geol. of Wis., vol. ii, pp. 357-360. 1877.
Upper Silurian. Wisconsin. Included in Niagara.

Waukesha beds, Chamberlin. Geol. of Wis., vol. i, p. 187. 1883.
Silurian. Wisconsin. Included in Niagara.

Waverly sandstone series, Mather. Am. Jour. Sci., 1st ser., vol. xxxiv, p. 356. 1838.
Ohio.

Waverly sandstone series, Briggs. Ohio Geol. Surv., 1st Ann. Rept., by W. W. Mather, p. 79. 1838.
Corboniferous. Ohio.

Waverly sandstone, Owen. Geol. Reconn. Indiana, 2d Rept., 1838, pp. 37, 44. 1839.

Waverly rock, Owen. Geol. Reconn. Indiana, Rept., 1838, pt. ii, p. 59. 1859.
Carboniferous. Ohio. Exact syn. Soft freestone of the knobs (Knob-stone group) of Indiana.

Waverly group, Newberry. Ohio Geol. Surv., Rept. Prog., 1869, p. 28. 1870.
Carboniferous. Ohio. Includes Cuyahoga shale, Berea grit, Bedford shale, and Cleveland shale.

Waverly sandstone, Newberry. Ohio Geol. Surv., Rept. Prog., 1869, p. 21. 1870.
Carboniferous. Ohio.

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Ohio.

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Ohio.

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Carboniferous. Ohio. Includes Cuyahoga shale, Berea grit, Bedford shale, and Cleveland shale.

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Carboniferous. Ohio.

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Carboniferous. Ohio. Includes Cuyahoga shale, Berea grit, and Bedford and Cleveland shales.

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Carboniferous. Ohio. Included in Lower Carboniferous. Includes Cuyahoga shale, Berea grit, Bedford shale and Cleveland shale.

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Carboniferous. Ohio.

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Carboniferous. Ohio. Included in Subcarboniferous.

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Carboniferous. Michigan. Includes Winchells, Marshall group, and part of his Huron group. Exact syn. Waverly group of Ohio.

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Carboniferous. Kentucky. Exact syn. Siliceous group.

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Carboniferous. Ohio.

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Carboniferous. Ohio.

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Ohio. Includes Logan series, Cuyahoga shale, Berea shale, Berea grit, and Bedford shale.

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Ohio.

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Ohio. Includes Cuyahoga or Waverly series, and Berea or Transition series.

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Ohio. Included in Berea or Transition series.

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Carboniferous. Mississippi Valley. Includes Chouteau limestones and Vermicular sandstone. Exact syn. Kinderhook group.

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Carboniferous.

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Carboniferous. Ohio.

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Carboniferous. Pennsylvania. Included in Upper Productive Measures.

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Carboniferous. Ohio.

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Tertiary. Texas. Included in Eocene.

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Carboniferous. Nevada.

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Carboniferous. Utah. Included in Upper Carboniferous.

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Carboniferous. Nevada.

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Carboniferous. Kansas. Included in Permian. Includes Wellington shales.

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Devonian (?). Alaska.

West Franklin limestone, Collett. Indiana Dept. Geol. and Nat. Hist., 13th Ann. Rept., for 1883, p. 61. 1884.
Carboniferous. Indiana. Exact syn. Carthage limestone (?).

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Devonian. Ohio.

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Devonian. Ohio. Included in Upper Helderberg.

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Devonian. Ohio.

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Silurian. Ohio. Included in Niagara series.

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Ohio.

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Recent. Tennessee.

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Carboniferous. Missouri. Included in Carboniferous (Missourian series), Bethany limestone.

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Silurian. Massachusetts. Included in Chester amphibolites.

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Upper Carboniferous. Missouri. Included in Upper Coal Measures.

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Carboniferous. Canada.

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Cambrian. Maryland.

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Cambrian. Maryland, Virginia.

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Cambrian. Maryland.

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Algonkian. Lake Superior region. Included in Lower Marquette series.

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Whately bed, Emerson. U. S. Geol. Surv., Mon., vol. xxix, p. 190. 1898.
Silurian. Massachusetts. Included in Conway schists.

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Eocene. Florida. Exact syns. Orbitolite or Nummulite limestone.

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Tertiary. Alabama. Included in Upper Eocene.

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Juratrias. Utah.

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Carboniferous. Ohio. Included in Coal Measures.

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Silurian. Colorado.

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Tertiary. Alabama. Part. syns. Jacksonian and Vicksburg.

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Silurian. Colorado.

White limestone, Aldrich. Ala. Geol. Surv., Bull. No. 1, p. 42. 1886.
Tertiary. Alabama.

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Tertiary. Alabama.

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Eocene Tertiary. Alabama. Included in Upper Eocene. Includes Vicksburg, Red Bluff, Jackson, and Coral limestone.

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Cretaceous. Arkansas. Included in Chalky marl beds. Part. syns. Austin limestone, Dallas limestone, Niobrara beds.

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Tertiary. Georgia. Included in Eocene.

White limestone, Clark. U. S. Geol. Surv., Bull. No. 83, p. 58. 1891.
Tertiary. Alabama. Included in Eocene. Includes Coral limestone, Vicksburg, and Jackson.

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Cambrian. New Jersey.

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Post-Archean. New Jersey.

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Tertiary. Georgia.

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Pleistocene. Ohio Valley.

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Tertiary. Alabama.

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Cretaceous. Indian Terr., Texas. Included in Glauconitic division.

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Cambrian. New Jersey.

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Tertiary. Alabama. Included in Eocene. Includes Vicksburg, Jackson, and Red Bluff groups.

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Archean. New Jersey.

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Tertiary. Arkansas. Included in Clairbornian stage, Eocene.

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Eozoic. New Hampshire.

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Silurian. Tennessee. Included in Niagara group.

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Silurian. Tennessee. Included in Niagara period.

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Devonian. Nevada.

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Post-Tertiary. Arkansas.

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Tertiary. Nebraska. Exact syn. Miocene.

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Tertiary. Northwest.

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Tertiary. Included in Miocene.

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Tertiary.

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Tertiary.

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Tertiary.

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Tertiary. Wyoming. Included in Miocene.

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Tertiary. Colorado. Included in Miocene.

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Tertiary.

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Lower Miocene. South Dakota. Includes Titanotherium beds, Areodon beds, *and Protoceras* beds.

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Tertiary. Nebraska. Part. syn. Oligocene.

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Cambrian. Missouri. Included in Ozark series. Includes Joachim limestone, Crystal City sandstone, Potosi limestone, St. Joseph limestone, La Motte sandstone, and Iron Mountain conglomerate. Part. syn. Gasconade limestone.

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Tertiary. Kansas, Nebraska, and Colorado.

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Cretaceous. Alabama. Included in Upper Cretaceous.

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Silurian. Massachusetts. Included in Conway schists.

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Cretaceous. Oregon.

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Carboniferous. Texas. Included in Permian.

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Permian. Texas. Part. syn. Dunkard Creek.

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Carboniferous. Texas. Included in Permian.

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Permian. Texas. Exact syn. Albany division.

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Carboniferous. Texas. Included in Strawn division.

Wilbur Tuff lentil, Diller. U. S. Geol. Surv., Geol. Atlas of U. S., Folio No. 49. 1898.
Tertiary. Oregon. Included in Eocene.

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Carboniferous. Kentucky.

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Pliocene. California.

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Archean(?). Tennessee. Included in Ocoee(?).

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Algonkian(?). Tennessee. Included in Ocoee series.

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Tennessee, North Carolina. Included in Ocoee group.

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Carboniferous. Kansas.

Williamsport sandstone, Gorby. Indiana Dept. Geol. and Nat. Hist., 15th Ann. Rept., 1886, p. 86. 1886.
Indiana.

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Laramie. Canada.

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Tertiary. Colorado. Exact syn. Arapahoe.

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Cretaceous. Alberta. Included in Laramie.

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Silurian. Iowa. Included in Lower Silurian, St. Peter sandstone, and Lower Magnesian limestone. Exact syn. Shakopee limestone.

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Tertiary. Texas. Included in Eocene.

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Tertiary. Texas. Included in Eocene.

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Tertiary. Texas. Included in Eocene.

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Tertiary. Texas. Included in Basal division of Eocene.

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Tertiary. Texas. Included in Eocene.

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Lower Eocene. Texas. Included in Lignitic. Exact syn. Midway.

Wilmington beds, Dall. U. S. Geol. Surv., 18th Ann. Rept., pt. ii, p. 344. 1898.
Tertiary. North Carolina. Included in Claibornian stage, Eocene.

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DEPARTMENT OF THE INTERIOR

BULLETIN

OF THE

UNITED STATES

GEOLOGICAL SURVEY

No. 192

SERIES F, GEOGRAPHY, 29

WASHINGTON
GOVERNMENT PRINTING OFFICE
1902

UNITED STATES GEOLOGICAL SURVEY

CHARLES D. WALCOTT, DIRECTOR

A

GAZETTEER OF CUBA

BY

HENRY GANNETT

WASHINGTON
GOVERNMENT PRINTING OFFICE
1902

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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
Washington, D. C., October 8, 1901.

SIR: I transmit herewith, for publication as a bulletin, the manuscript of a gazetteer of Cuba.

Very respectfully,
HENRY GANNETT,
Geographer.

Hon. CHARLES D. WALCOTT,
Director United States Geological Survey.

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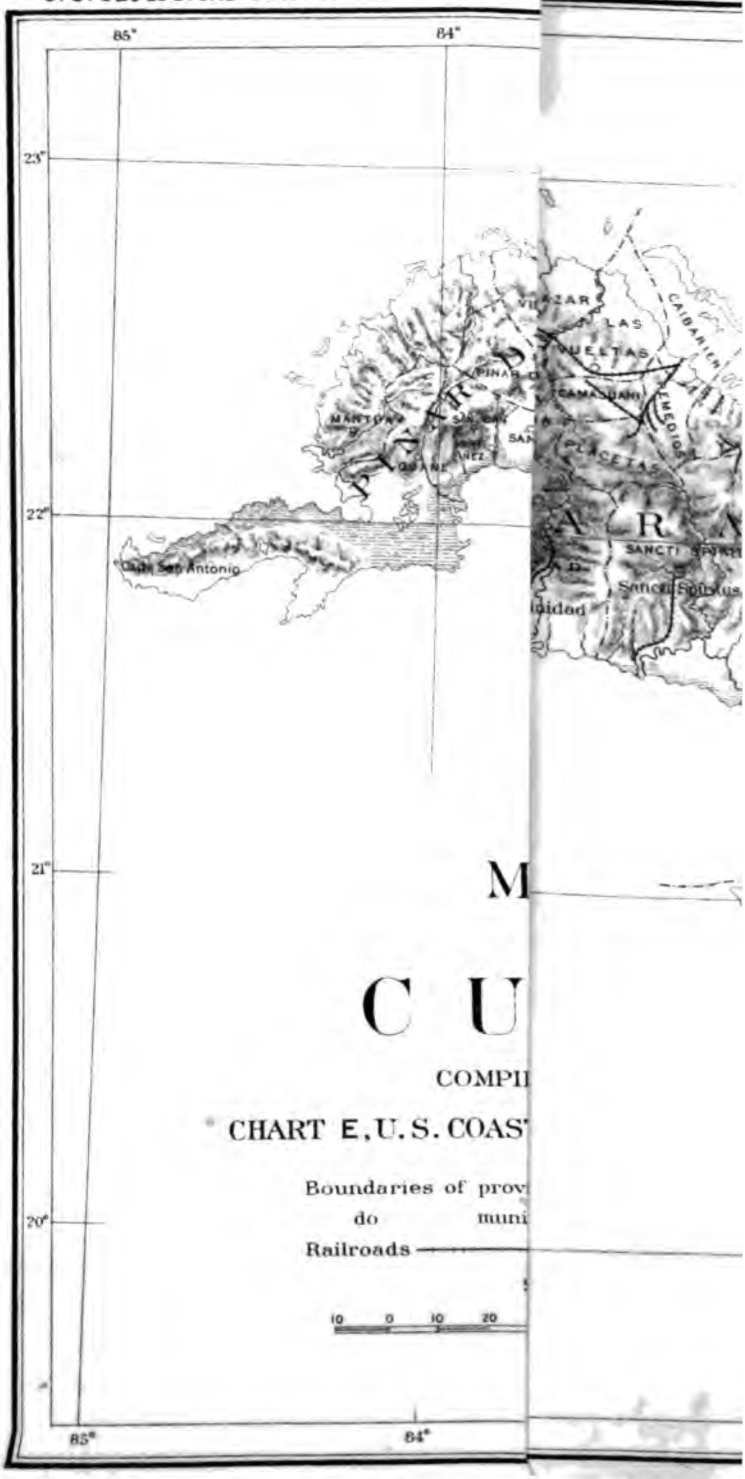
U. S. GEOLOGICAL SURVEY



A GAZETTEER OF CUBA.

By Henry Gannett.

GEOGRAPHY AND TOPOGRAPHY.

Cuba, the largest and most populous of the West Indian Islands, lies directly south of Florida. Habana, the capital, is a little west of south of Key West, and is distant, in a straight line, about 100 miles, being separated from it by the Strait of Florida. Cuba lies between the meridians of 74° and 85° west of Greenwich and between the parallels of latitude 19° 40′ and 23° 33′. Its extreme length, from Cape Maisi on the east to Cape San Antonio on the west, is 730 miles. Its breadth differs greatly in different parts, ranging from 100 miles in the east to 25 miles in the neighborhood of Habana. Its area, including Isla de Pinos and the bordering keys, may be accepted as approximately 44,000 square miles.

The north coast is mainly steep and rocky and in the middle portion of the island is bordered by lines of islands and coral reefs, the passages through which are extremely intricate. These islands are low, mainly covered with mangrove thickets, and contain few inhabitants. In the western part of Cuba the coast bluffs are low, being only about 100 feet in height, but they gradually rise eastward until in the neighborhood of Matanzas they are fully 500 feet above the sea. Farther east, in Santa Clara and Puerto Principe, they are lower, while toward the eastern end of the island, in Santiago Province, the coast is rugged and almost mountainous, rising from the sea in a succession of terraces.

From Cape Maisi westward the south coast is bordered by mountains. That portion of it extending from Santiago to Cape Cruz is bordered by Sierra Maestra, which rises abruptly from the water to an altitude of several thousand feet. From Cape Cruz the coast trends northward around the Bay of Buena Esperanza, into which opens the broad and fertile valley of Rio Cauto, the largest stream of the island. The shores of this bay and most of the coast thence westward to Cape Antonio, the west point of Cuba, are low and marshy. This coast consists in the main of a narrow strip, but west of Cienfuegos it extends far inland, forming the great Zapata Swamp, an almost impenetrable region 75 miles in length in an east-and-west direction by 30 miles in breadth. Off the south coast are many low, marshy, mangrove-covered islets. Most of the harbors of both the north and south coasts are of peculiar shape, with narrow, crooked entrances, opening within into basins of considerable extent, which are thus completely sheltered. This is the character of the harbors of Habana, Santiago, Cienfuegos, Guantanamo, and many others.

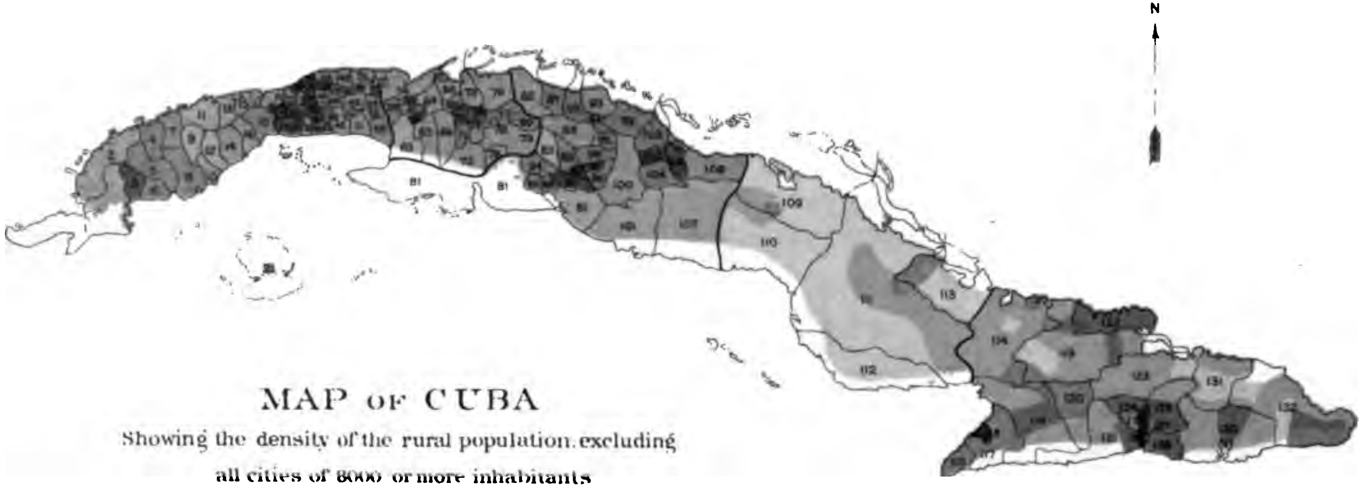
The relief of the island is complicated, being composed of several disconnected features which apparently bear little relation to one another. The middle portion of the island, including the provinces of Habana, Matanzas, Santa Clara, and Puerto Principe, presents little relief, consisting in the main of broad, undulating plains and shallow valleys. It is only at the two ends of the island, namely, in Pinar del Rio in the west and Santiago in the east, that the country presents any decided features. Throughout Pinar del Rio Province runs a range of hills parallel to the coasts, a little north of the middle of the island, known as the Organ Mountains (Sierra de los Orgaños). These rise in many places to altitudes exceeding 2,000 feet, and culminate in the summit known as Guaguibon, which has an altitude of about 2,500 feet. From the crest of this range, which forms a watershed, the land descends gently northward and southward to the coast. The southward slopes form the celebrated tobacco land known as Vuelta Abajo.

The Organ Mountains cease as a range a little west of the city of Habana, but traces of this uplift can be followed eastward, through Matanzas and Santa Clara provinces, in lines of low hills rising from the extended plains. Such hills are the Tetas Managua, near Habana, and the Pan del Matanzas, just south of the city of the same name.

In Santiago Province, at the eastern end of the island, the country breaks up in bold relief. Along the south coast is the Sierra Maestra, separating the coast from the valley of the Rio Cauto, reaching altitudes exceeding 5,000 feet, and in one peak, Turquino, a height of 8,320 feet. This range extends unbroken from Cape Cruz eastward to Santiago, and thence in a more broken, plateau-like form, to the east end of the island. The interior of Santiago Province north of the valley of the Cauto consists in the main of a greatly dissected plateau, rising to altitudes of 1,000 to 2,000 feet.

Isla de Pinos lies to the south of the main island. The northern part of this island is slightly broken in surface, while the southern part, which is nearly disconnected from it by a strip of swamp, is low and level.

The rivers of Cuba are numerous, but short, and few of them are of any importance to navigation. The largest stream is the Rio Cauto, in Santiago Province, which drains a broad and very fertile valley. This river, which has a total length of 150 miles, is navigable for small vessels as far as Cauto Embarcadero, about 50 miles above its mouth.



MAP OF CUBA

Showing the density of the rural population, excluding all cities of 8000 or more inhabitants

LEGEND

- Less than 2 to Sq mile
- 2-6 to Sq mile
- 6-18 to Sq mile
- 18-45 to Sq mile
- 45-90 to Sq mile
- Over 90 to Sq mile

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The next river in point of importance is the Sagua la Grande, on the north slope of the island, in Santa Clara Province, which is navigable for about 20 miles. Of the many other streams of the island few are navigable at all, while others are navigable only within their estuaries. The interior of the island is dependent upon its few railroads, of which there are only 1,100 miles, and its poor wagon roads.

MINERAL RESOURCES.

The mineral resources of the island, so far as developed, are limited, and consist almost entirely of iron ore. Iron has been mined for many years at the south base of the Sierra Maestra, a few miles east of Santiago. The ores are hematite, with a little limonite, and are found principally as float ore in the bowlders. It is not certain that any ore has been found in place. The ore is of excellent quality, containing about 62 per cent of iron, and is easy to work. The developments are in the hands of three companies, and nearly all of the ore produced has been shipped to the United States, principally to Baltimore. Copper deposits, said to have been of enormous richness, were worked for many years under the Spanish régime, in the neighborhood of Cobre, but in recent years operations have ceased, and the mines are at present filled with water. Asphaltum has been found in several places, particularly near the city of Santa Clara, where it has been utilized in making illuminating gas.

A little gold and silver has been mined in past times, but for many years the island has not produced any of these metals.

CLIMATE.

The climate of Cuba is comparatively simple and can be briefly described. With the long narrow shape of the island and its great extent of coast line, it has, in high degree, an insular climate, with a high mean temperature, great humidity, and ample rainfall. Lying within the tropics, the island is subjected to the northeast trades, which blow over it steadily and constantly. They bring to the north coast and the northern slopes of the island an ample rainfall, while the southern slopes, especially at the eastern end, protected by the mountains from the trade winds, receive a much less amount of rainfall, although sufficient for the cultivation of most crops. At Habana, on the north coast, the mean annual temperature is 77°, and the range of temperature between the mean of the hottest month and that of the coldest month is from 82° to 71°. The highest temperature on record in Habana is 100.6°; the lowest, 49.6°. The maximum temperature is not as high as in many northern cities of the United States, but the duration of high temperature in Cuba is much greater. But notwithstanding the long-continued high temperature, the northern slopes of the island are cooled by the constant trade winds, and the nights, even in summer, are cool. The figures given above for Habana represent the conditions of the island fairly well, excepting that on the south coast and in the interior the temperature is a little higher. The mean annual rainfall at Habana, derived from observations of many years' duration, is 52 inches, and this figure represents quite closely the rainfall throughout the north coast of the island. The rainfall is decidedly less than upon the Gulf coast of the United States, and is but little greater than that of the northern seaboard cities. About two-thirds of this rainfall descends between May and October, the remainder of the year being comparatively dry.

CIVIL DIVISIONS.

For administrative purposes Cuba is divided into six provinces, which, named from the west eastward, are Pinar del Rio, Habana, Matanzas, Santa Clara, Puerto Principe, and Santiago. These provinces are divided into municipal districts, or *terminos municipales*, of which there are 132 in the island, including the Isla de Pinos, which forms a municipal district of Habana Province. The number of municipal districts in each province is given below.

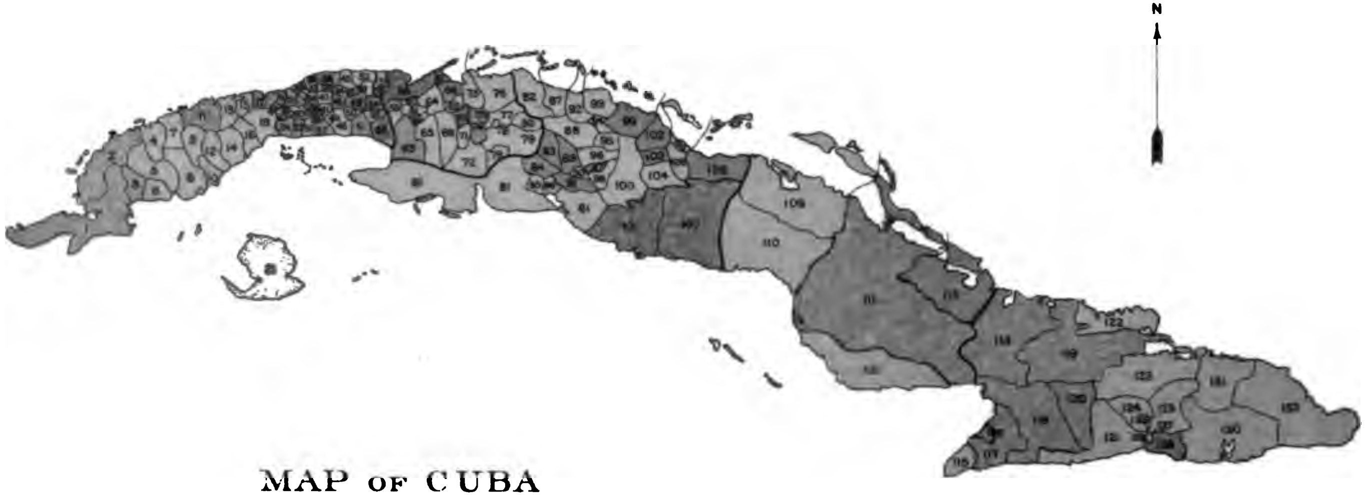
Number of municipal districts in each province.

Habana Province	36
Pinar del Rio	20
Matanzas	24
Santa Clara	28
Puerto Principe	5
Santiago	19

The municipal districts are in turn divided into barrios, of which there are approximately 1,500 in the island, including those constituting the cities. Such organizations as cities, in the sense in which we understand the term, do not exist in Cuba. The city of Habana has no legal limits, but comprises most of the municipal district of that name. This includes not only a large urban population, but also a small number of rural inhabitants. By the recent census the population of the cities of the island was obtained by selecting from among the barrios composing the municipal districts those whose population was urban in character.

HISTORY.

Cuba was discovered by Columbus on October 28, 1492, the landing being at or near the present city of Nuevitas, on the north coast of the province of Puerto Principe. He explored this coast from the Laguna de Moron eastward to Cape Maisi, at the eastern end of the island. On this voyage and in other subsequent visits to the island, explored most of the remaining parts of the coast.



MAP OF CUBA

Showing the distribution by sex

LEGEND

- ☐ Males 50 to 55%
- ■ Males over 55%
- ■ Females over 50%

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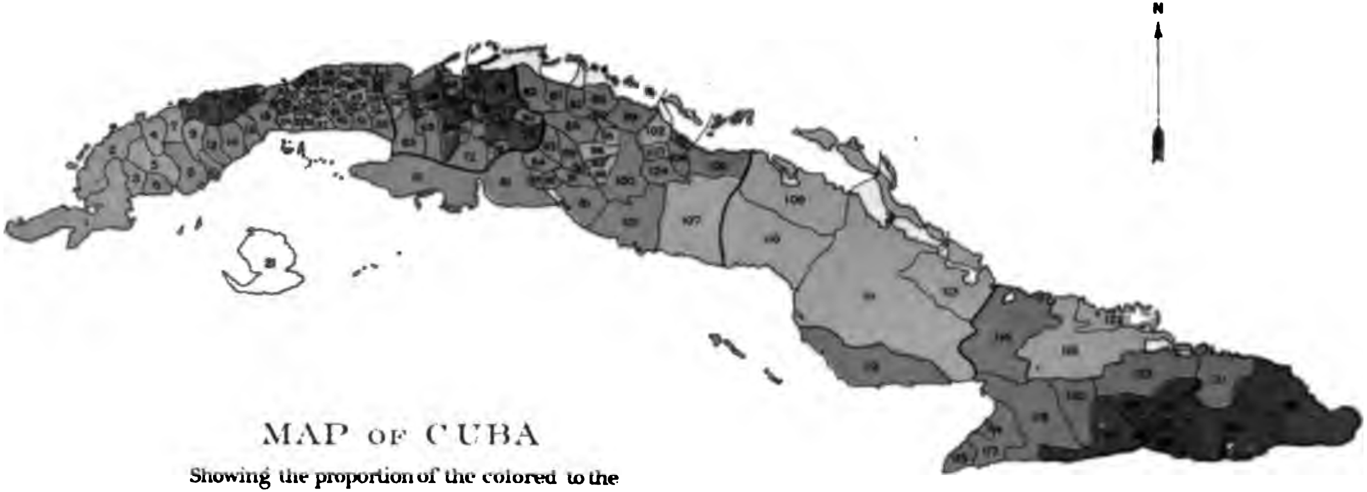

MAP OF CUBA

Showing the proportion of the colored to the total population

LEGEND

☐ Less than 25%
▨ 25 to 50%
■ Over 50%

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For several years little attention was paid to the island, and it was not until 1512 that colonization was attempted. That year Velasquez, with a force of 300 men, founded the town of Baracoa, near the eastern end of the island, and two years later Trinidad and Santiago, together with a number of other towns in the interior. In 1519 Habana was founded, and in 1552 it became the capital. The growth of European population in Cuba was particularly slow during the first 250 years, and in 1775 the population numbered only 171,620. The occupation of Cuba by the Spaniards was continuous from the date of its colonization to 1898, with the exception of the English invasion of 1762, during which Habana and a part of Matanzas Province were taken possession of by the English and held for a few months. On December 10, 1898, the sovereignty of Spain in Cuba was relinquished by treaty to the United States, after a war which, though brief, was exceedingly disastrous to Spanish power and prestige.

While thus measurably free from foreign invasion for centuries, the island was on several occasions the scene of domestic disturbances, due in nearly all cases to Spanish misrule. Such were the insurrections of 1717, 1812, 1826, and at several later dates, but none of these were of serious importance. In 1868, however, an insurrection broke out, and continued, with desultory fighting in various parts of the island, for ten years. The recent insurrection was the most general and serious of these domestic disturbances. It broke out in 1895, and was ended in 1898 by the intervention of the United States. It is unnecessary to speak of this at length, since the events of that struggle are recent and well known.

The aboriginal inhabitants of Cuba have been variously estimated at from 200,000 to 1,000,000. In all probability the former figures are nearer the truth. Upon the settlement of the island by the Europeans these natives were promptly enslaved and put to work on the plantations and in the mines, where they soon succumbed to hard work, and within fifty years of the date of the first colonization, or long before the end of the sixteenth century, the aboriginal population of Cuba had been wiped off the face of the earth, and at present no trace of Indian blood is to be found in the island. Upon the destruction of the Indian element its place was taken by African slaves, and for centuries the African slave trade was a most profitable one, ceasing only with the abolition of slavery in 1883.

POPULATION.

The population of Cuba, according to the census taken under the direction of the United States War Department in 1899, was 1,572,797. Twelve years earlier, in 1887, according to a census taken under Spanish authority, the number was reported as 1,631,687, or nearly 59,000 greater. After allowing for the probable increase of the population between 1887 and 1895, the date on which the insurrection broke out, the loss of life, as indicated by these two censuses, may be estimated at nearly 200,000, a loss which may be attributed to the war and to the accompanying reconcentration.

The first census of Cuba upon which any reliance can be placed was taken in 1775. The following table shows the population at the date of each subsequent census and the decennial rate of increase:

Population of Cuba at each census.

Year.	Population.	Rate of increase per decade.
1775	171,620	....
1792	272,300	31
1817	572,363	34
1827	704,486	23
1841	1,007,624	29
1861	1,396,530	18
1877	1,509,291	5
1887	1,631,687	8
1899	1,572,797	....

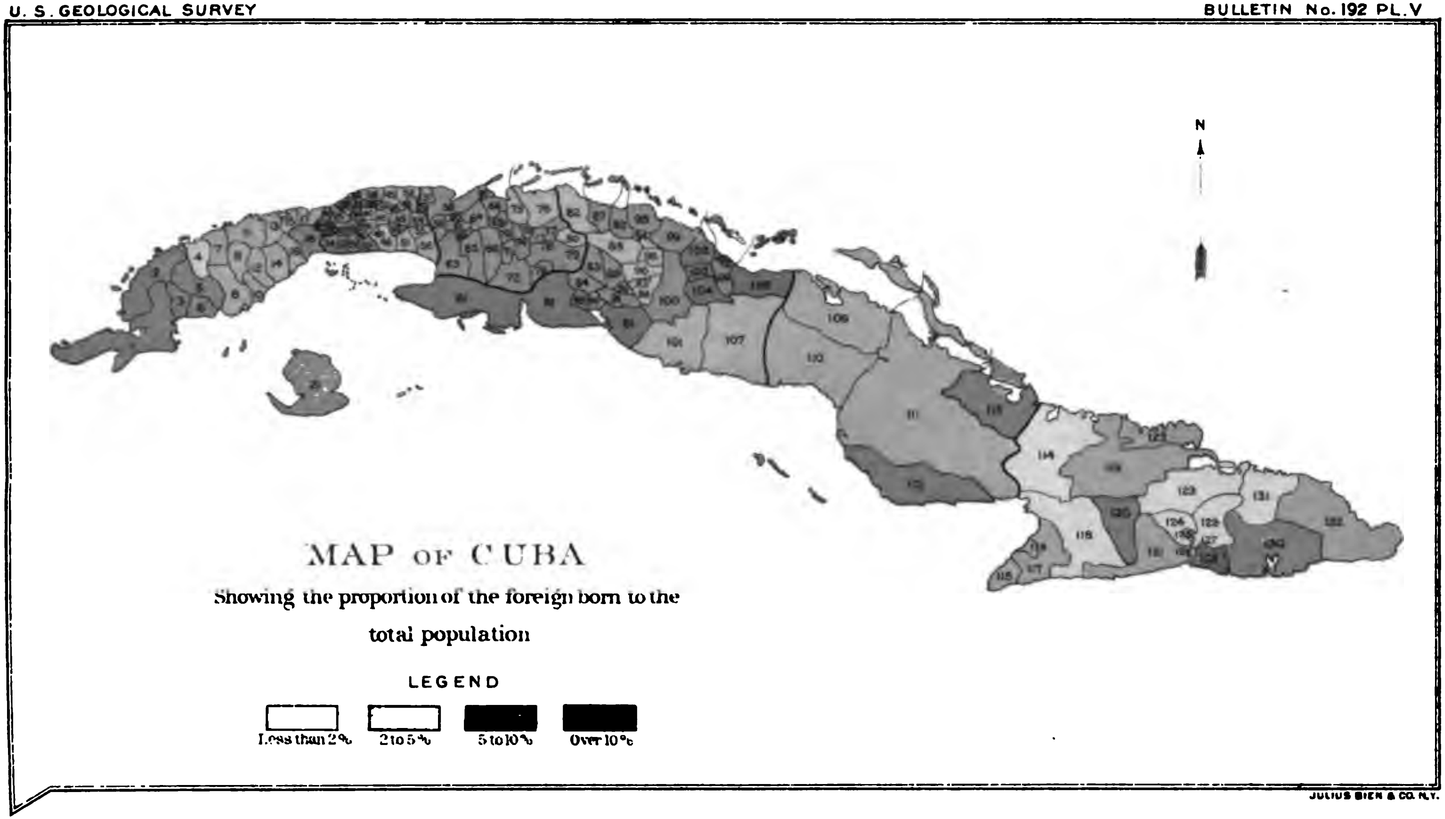
The loss in population incident to the insurrection was sustained entirely by the three western provinces, the three eastern provinces having gained during the period between 1887 and 1899, although Santa Clara, one of the largest provinces of the island, gained but a trifling amount.

The density of population, taking the island as a whole, was 35.7 inhabitants to the square mile. The area, population, and density of population of the six provinces are given in the table below:

Area, total population, and density of population, by provinces.

Province.	Area.	Population.	Density.
	Sq. miles.		
Habana	2,772	424,811	153
Matanzas	3,700	202,462	55
Pinar del Rio	5,000	173,082	35
Puerto Principe	10,500	88,237	8
Santa Clara	9,560	356,537	37
Santiago	12,468	327,716	26

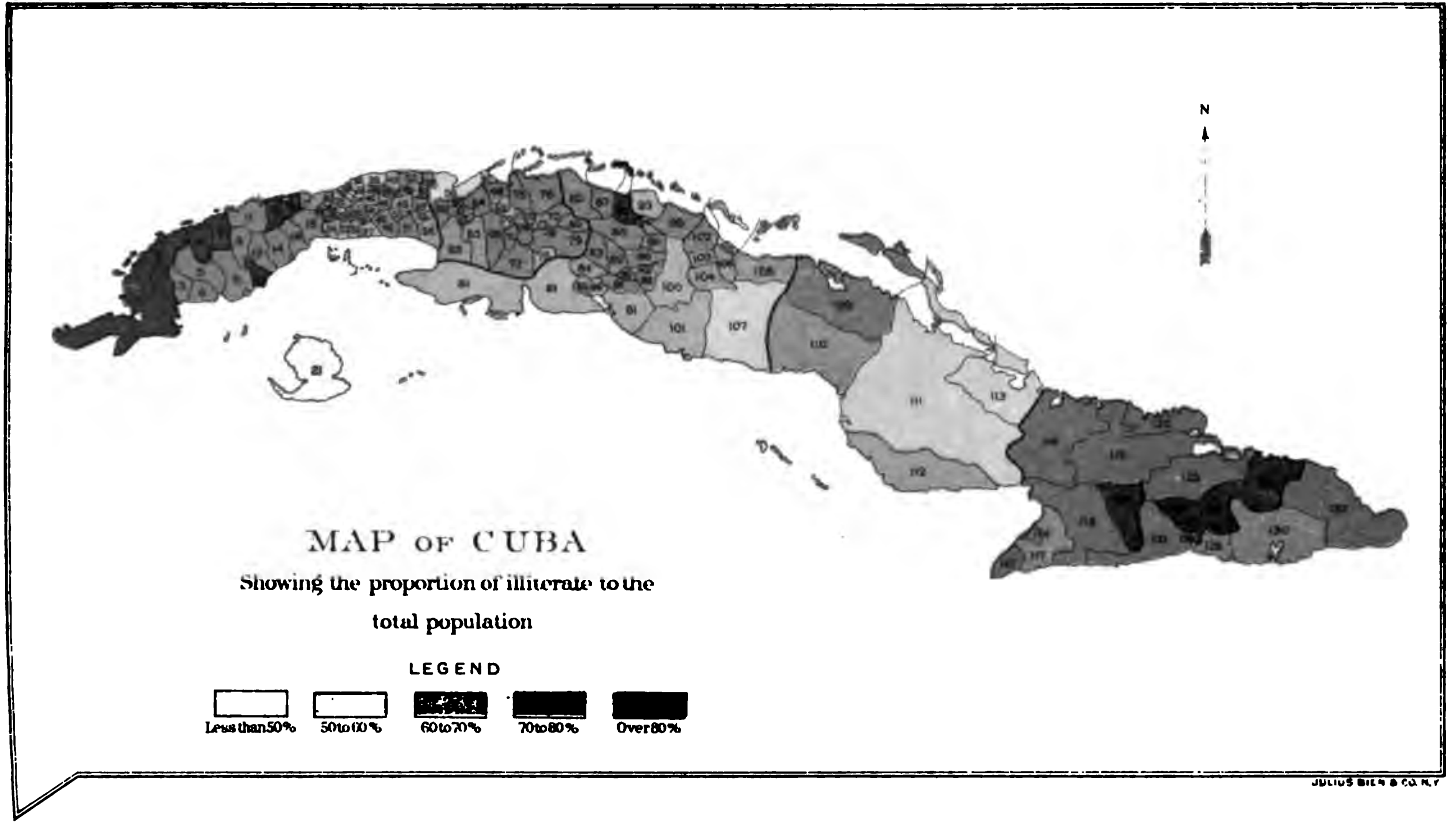
The urban population of Cuba, including in that term the inhabitants of all cities of more than 8,000 population, was 32.3 per cent of the entire population, or a little less than one-third, being but a trifle smaller than that of the United States. Including, however, all cities down to 1,000 each, the proportion of urban population rises to 47.1 per cent, that of the United States being the same. The capital and chief city of the island is Habana, situated on the north coast near its western end, with a population of 235,981. Other important cities are Santiago, the capital of Santiago Province, on the south coast near the eastern end of the island, population 43,090; Matanzas, the capital of anzas Province, on the north coast, population 36,374; Cienfuegos—



MAP OF CUBA

Showing the proportion of the foreign born to the total population

JULIUS BIEN & CO. N.Y.



MAP OF CUBA

Showing the proportion of illiterate to the total population

JULIUS BIEN & CO. N.Y.

in Santa Clara Province, on the south coast, population 30,038; Puerto Principe, the capital of the province of the same name, situated in the interior, population 25,102; Cardenas, on the north coast, in Matanzas Province, population 21,940. Most of the larger cities are situated upon the seacoast rather than in the interior, indicating their commercial character.

The center of population of Cuba in 1899 was situated in latitude 22° 15′ and longitude 80° 23′. This locates it in Santa Clara Province, 30 miles southwest of the city of Santa Clara, and 8 miles northeast of Cienfuegos. It is at a distance of 76 miles northwest of the geographic center of the island.

As to sex, the population was distributed in the proportions of 51.8 per cent males and 48.2 per cent females, the excess in the number of males being probably due to immigration.

As to race, there were 68 per cent white and 32 per cent colored. The colored formed less than one-third of the population, and their proportion has for many years been diminishing. The foreign-born formed 9 per cent of the total population, which leaves 60 per cent as native whites. Three-fourths of all the foreign-born in Cuba came from Spain. Of the remainder, the countries which most freely contributed were China, Africa, and the United States. Other West Indian islands, and even the neighboring countries of Central and South America, contributed very few, showing the extremely sedentary character of these peoples.

The foreign-born element was found mainly in the cities, and especially in the larger ones. Nearly one-third of the entire foreign-born element was found in the city of Habana, where it constituted 22 per cent of the entire population of the city.

The proportion of married, even when we add to the number of those legally married those who have assumed marital relations without the sanction of law, is very small, being only 24 per cent of the population, as contrasted with the proportion in the United States, 35.7 per cent. Of this proportion thus living together, either with or without the sanction of law, about two-thirds were legally married and one-third were living together without marriage. The legally married constituted only about one-half the proportion that they do in the United States.

Of the total population of Cuba, 34 per cent, or a little more than one-third, were able to read. For obvious reasons, illiteracy was greater among the colored than among the white, and greater in rural districts than in cities.

The proportion of Cubans reported as being employed in gainful occupations was 40 per cent, or two-fifths of the total population, a proportion larger than in either the United States or Porto Rico. Of the males, 68 per cent were reported as wage-earners; of the females only 9 *per cent*.

The wage-earners were distributed in the following proportions among the great groups of occupations:

Occupations of wage-earners.

	Per cent.
Agriculture, fisheries, and mining	48
Domestic and personal service	23
Manufactures	15
Trade and transportation	13
Professions	1

AGRICULTURE.

There were, in 1899, 60,711 farms, with a total area of 262,858 caballerias, a caballeria being equal to 33 acres. The average size of a farm in Cuba was 143 acres, and the average area cultivated per farm 13 acres. Of the entire area of Cuba 30 per cent was reported to be in farms, but only 3 per cent of the area of the island, and only 10 per cent of the area in farms, was under cultivation. The most highly cultivated parts of the island were in Matanzas and Habana provinces. In Puerto Principe cultivation is comparatively slight, most of the farms consisting of mere cattle ranches.

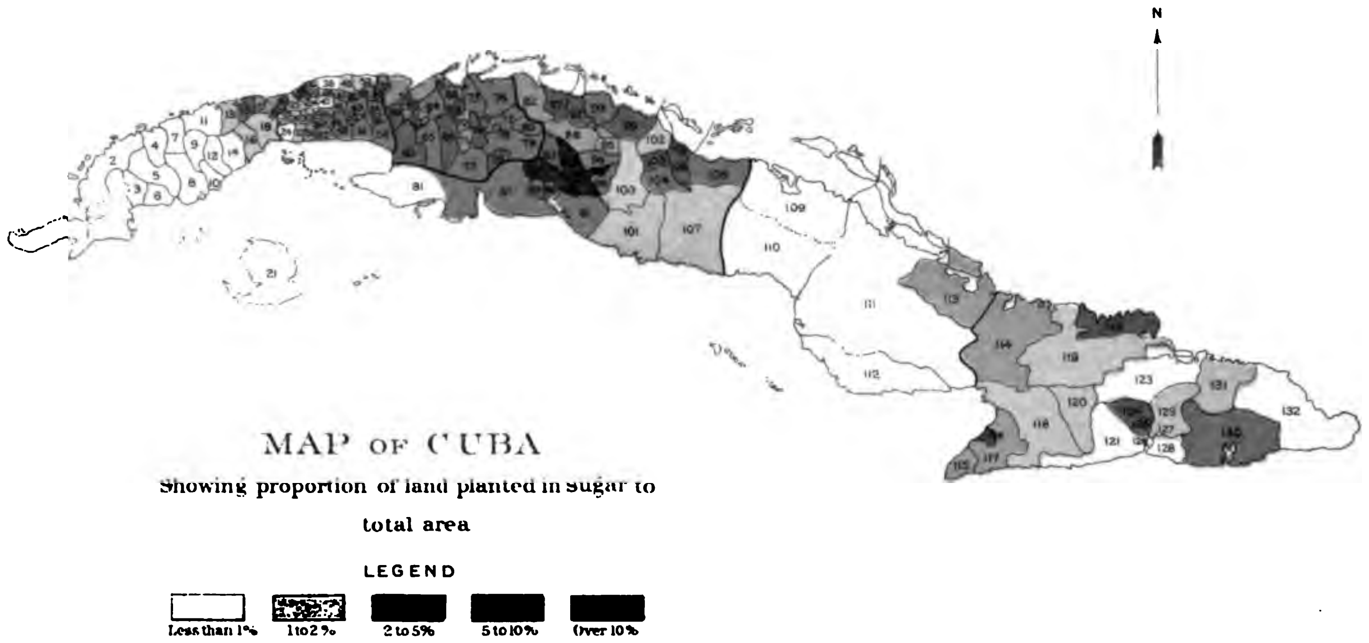
Of the cultivated area of Cuba, less than one-half was owned by its occupants, and a little more than one-half was rented. Of this cultivated area 85 per cent was occupied by whites, either as owners or renters, and only 11 per cent by colored, the remainder being unknown.

The only measure of farm products obtained by the census was in terms of areas cultivated in the several crops. Measured thus by areas under cultivation, sugar cane is far the most important crop of the island, occupying 47 per cent, or nearly one-half the cultivated area. Sweet potatoes are second on the list, with 11 per cent; tobacco 9 per cent. Bananas occupy little less than 9 per cent, and other crops occupy still smaller proportions. Sugar cane was produced in all the provinces of the island, but had the greatest importance in the provinces of Santa Clara and Matanzas, which together produced nearly three-fourths of the crop, as measured by the area under cultivation. Santiago produced about one-sixth of the crop and Habana about one-sixteenth, the proportions produced in the other provinces being trifling.

Tobacco was produced in all the provinces, but three-fourths of the entire production, as measured by the area under cultivation, came from the province of Pinar del Rio, and nearly all the remainder from Habana and Santa Clara.

Coffee, which was once a product of great importance in Cuba, has diminished in recent years, and now but little is produced, that little coming from the provinces of Santiago and Santa Clara.

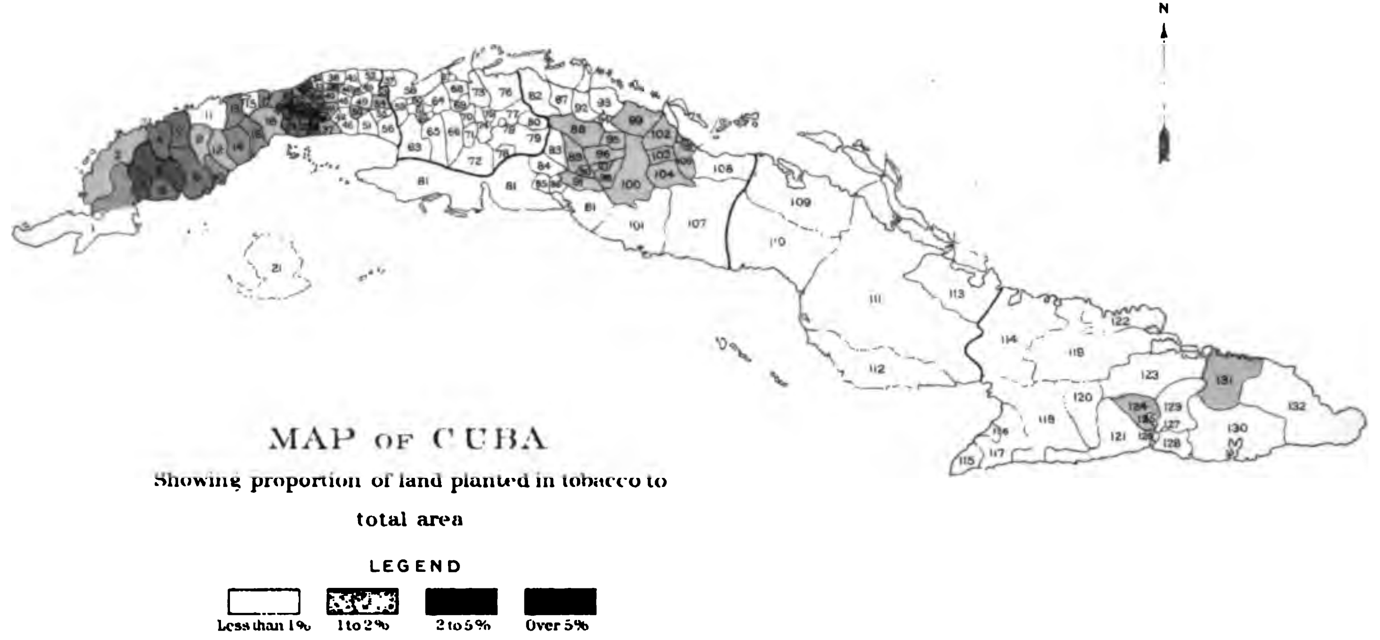
There were in Cuba, in 1899, 207 sugar mills, or centrals, with a *daily production* of 61,407 bags of sugar. There were also 85 stills, *with a daily capacity* of 161,751 gallons.



MAP OF CUBA

Showing proportion of land planted in sugar to total area

JULIUS BIEN & CO N.Y.



MAP OF CUBA
Showing proportion of land planted in tobacco to total area

JULIUS BIEN & CO. N.Y.

GAZETTEER.

[In the following list the Spanish generic terms are used, followed by the English equivalent.]

Abalos, Punta; point on west coast of province of Pinar del Rio.

Abreus; municipal district in province of Santa Clara. Area 52 square miles. Population 3,995.

Abreus; city in interior of province of Santa Clara. Population 1,300.

Aceituno, Arroyo; small branch of Arroyo Zacatecas in northern part of province of Santa Clara.

Acosto, Arroyo; creek in northern part of Sagua de Tanamo, province of Santiago.

Acostos, Sierra de Los; mountains in municipal district of Guane, province of Pinar del Rio.

Afuera, Punta de; point at entrance of Bahia Honda, north coast of province of Pinar del Rio.

Afuera, Punta de; point on north coast of San Antonio peninsula, province of Pinar del Rio.

Agabama, Rio; tributary of Rio Manati in southern part of province of Santa Clara. Length 20 miles.

Agabama, Sierra Alta de; mountains in municipal district of Santa Clara, province of Santa Clara.

Agial, Arroyo; short, left-hand branch of Toa River in Santiago Province.

Aguacate; municipal district in Habana Province. Area 63 square miles. Population 3,163.

Aguacate; city in interior of Habana Province. Population 1,555.

Aguacate; village in municipal district of Bahia Honda, province of Pinar del Rio.

Aguacate; barrio in municipal district of Aguacate, province of Habana.

Aguacate; barrio in municipal district of Bahia Honda, province of Pinar del Rio.

Aguacate, Arroyo; right-hand branch of Rio Caguanes, in northern part of province of Santa Clara.

Aguacate, Loma; hills in western part of municipal district of Moron, province of Puerto Principe.

Aguacate, Loma del; hill in municipal district of Bahia Honda, province of Pinar del Rio.

Aguacero, Arroyo; small stream in municipal district of Puerto Principe, province of Santiago.

Aguada, Cayo; small island between Cayo Romano and north coast of province of Puerto Principe.

Aguada, Cayo de la; island off north coast of province of Santa Clara.

Aguada de Moya; village in northern part of province of Santa Clara, municipal district of Las Vueltas.

Aguada de Moya; barrio in municipal district of San Antonio de las Vueltas, province of Santa Clara. Population 1,065.

Aguada de Pasajeros; village in municipal district of Cienfuegos, province of Santa Clara.

Aguada de Pasajeros; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 8,777.

Aguadilla, Arroyo; short, left-hand branch of Rio Caguanes, in northern part of province of Santa Clara.

Aguadores, Surgidero de; anchorage in southern coast of province of Santiago, municipal district of Santiago de Cuba.

Aguas, Arroyo; stream in eastern part of municipal district of Ciego de Avila, province of Puerto Principe.

Aguas Blancas, Arroyo; right-hand branch of Rio Cauto in municipal district of Puerto Padre, Santiago Province. Length 35 miles.

Aguas Bonitas; barrio in municipal district of San Juan de las Yeras, province of Santa Clara. Population 415.

Aguas Claras; barrio in municipal district of Holguin, province of Santiago. Population 681.

Aguas Claras; barrio in municipal district of Rancho Veloz, province of Santa Clara. Population 1,218.

Aguas Verdes; barrio in municipal district of Bejucal, province of Habana.

Aguas Verdes, Arroyo; left-hand branch of Rio de las Caravelas in province of Puerto Principe.

Aguilar, Punta la; point on south coast of province of Santa Clara.

Agustin, Rio; left-hand branch of Rio San Juan, in northern part of province of Matanzas.

Ahoga Gallinas, Arroyo; stream in southern part of province of Santa Clara.

Ahoga Mulos, Arroyo; branch of Rio Nuevo Mayabeque in Habana Province.

Ajenjibre, Loma de; hills in eastern part of province of Puerto Principe.

Aji, Alto del; elevation on northern coast of Cayo Romano.

Aji, Cerros del; hills in eastern part of Isla de Pinos.

Alacrán; barrio in municipal district of Cifuentes, province of Santa Clara. Population 446.

Alacranes; municipal district in province of Matanzas. Area 322 square miles. Population 8,110.

Alacranes, Cayo; small island off north coast of province of Pinar del Rio.

Albino; barrio in municipal district of Viñales, province of Pinar del Rio. Population 739.

Alcala; village in municipal district of Holguin, province of Santiago.

Alcala; barrio in municipal district of Holguin, province of Santiago. Population 2,022.

Alcaldi, Arroyo; stream sinking in Cienaga Zapata in southern part of province of Santa Clara.

Alcatraz, Cayo del; island north of province of Santa Clara.

Alegre, Punta; point on coast of municipal district of Holguin, province of Santiago.

Alegrias, Estero; inlet and creek on south coast of province of Puerto Principe.

Alfonsos; village in municipal district of Holguin, province of Santiago.

Alfonsos; barrio in municipal district of Holguin, province of Santiago. Population 1,086.

Alfonso XII; town in municipal district of Alacranes, province of Matanzas.

Algodonar, Laguna del; lake in municipal district of Guane, southern part of province of Pinar del Rio.

Algodonar, Laguna del; small lake in province of Puerto Principe, municipal district of Moron.

Algodonar, Punta del; point on entrance of Guadina Harbor, on west coast of province of Pinar del Rio.

Alijo, Cayo; islet off north coast of municipal district of Puerto Principe, province of Puerto Principe.

Almendares, Rio; river in Habana Province, flowing to north coast.

Almiqui, Cerro; mountain in western part of Holguin, province of Santiago.

Alonso Rojas; village in municipal district of Consolacion del Sur, province of Pinar del Rio.

Alonso Rojas; barrio in municipal district of Consolacion del Sur, province of Pinar del Rio. Population 2,132.

Alonso Rojas, Cayos; islets off west coast of province of Pinar del Rio.

Alonso Rojas, Punta; point on west coast of Pinar del Rio.

Alquizar; municipal district in province of Habana. Area 78 square miles. Population 8,746.

Alquizar; city in interior of province of Habana. Population 3,714.

Alquizar, Primero; barrio in municipal district of Alquizar, province of Habana. Population 1,837.

Alquizar, Segundo; barrio in municipal district of Alquizar, province of Habana. Population 1,877.

Altagracia; town in municipal district of Puerto Principe, province of Puerto Principe.

Altagracia; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 1,240.

Altamisal; barrio in municipal district of Maximo Gomez, province of Matanzas. Population 776.

Altamisal; barrio in municipal district of Perico, province of Matanzas. Population 1,689.

Altares, Ensenada los; small bay on south coast of Santiago Province, municipal district of Santiago de Cuba.

Alto Songo; municipal district in province of Santiago. Area 450 square miles. Population 12,770.

Alto Songo; city in interior of province of Santiago. Population 3,158.

Alvarez; village in municipal district of Santo Domingo, province of Santa Clara.

Alvarez; barrio in municipal district of Bolondron, province of Matanzas.

Alvarez; barrio in municipal district of Santo Domingo, province of Santa Clara.

Alvaro, Punta de; point on north coast of province of Santa Clara.

Amarga, Laguna; lake in southern part of municipal district of Guantanamo, province of Santiago.

Amarillas; village in municipal district of Colon, province of Matanzas.

Amarillas; barrio in municipal district of Colon, province of Matanzas. Population 1,746.

Amaro; village in municipal district of Cifuentes, province of Santa Clara.

Amaro; barrio in municipal district of Cifuentes, province of Santa Clara. Population 248.

Amasabo; village in municipal district of Holguin, Santiago Province.

Anafe; barrio in municipal district of Bauta, province of Habana.

Ancon; village in municipal district of Viñales, province of Pinar del Rio.

Ancon; barrio in municipal district of Viñales, province of Pinar del Rio. Population 926.

Anconal, Sierra del; mountains in municipal district of Guane, western part of province of Pinar del Rio.

Andres, Arroyo; stream in the municipal district of Sagua de Tanamo, province of Santiago.

Angeles, Arroyo; small right-hand branch of Rio Cabreras, Santiago Province.

Anilito; barrio in municipal district of Managua, province of Habana.

Anton, Arroyo; right-hand branch of Rio Naranjo, municipal district of Puerto Padre, province of Santiago.

Arabos; barrio in municipal district of Macagua, province of Matanzas. Population 2,241.

Aragon, Sierra de; mountains in eastern part of municipal district of Baracoa, province of Santiago.

Arango; barrio in municipal district of Palmira, province of Santa Clara. Population 2,008.

Arango, Lomas de; hills in Habana Province.

Arenal, Punta del; point on north coast of province of Puerto Principe, municipal district of Nuevitas.

Arenas; town in municipal district of Puerto Padre, province of Santiago.

Arenas; barrio in municipal district of Puerto Padre, province of Santiago. Population 1,119.

Arenas; barrio in municipal district of Santo Domingo, province of Santa Clara.

Arenas, Arroyo; branch of Rio Culebra, in Habana Province.

Arenas, Punta; point on south coast of province of Santa Clara, near city of Cienfuegos.

Arenas, Punta; point on west coast of Isla de Pinos.

Arenas, Punta; point on northern coast of Cayo Sabinal, province of Puerto Principe.

Arenillas, Arroyo; tributary of the Palizon, in southern part of Puerto Principe.

Ariguanabo, Laguna de; lake in Habana Province.

Arimao; town on river of same name in municipal district of Trinidad, province of Santa Clara.

Arimao; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 3,015.

Arimao, Rio; river in province of Santa Clara, flowing to southern coast. Length 40 miles.

Aristizabal, Punta; point on south coast of province of Santa Clara.

Armenteros, Rio; tributary to Rio Nuevo Mayabeque, in Habana Province.

Armonia; barrio in municipal district of San Antonio de los Baños, province of Habana. Population 672.

Arrieta; barrio in municipal district of Cartagena, province of Santa Clara.

Arroyo; barrio in municipal district of Matanzas, province of Matanzas.

Arroyo Apolo; village in Habana province.

Arroyo Arenas; barrio in municipal district of Cano, province of Habana. Population 1,003.

Arroyo Blanco; village in municipal district of Gibara, province of Santiago.

Arroyo Blanco; barrio in municipal district of Gibara, province of Santiago. Population 1,739.

Arroyo Blanco; barrio in municipal district of Ciego de Avila, province of Puerto Principe. Population 862.

Arroyo Blanco, Loma; hill in western part of province of Puerto Principe, municipal district of Ciego de Avila.

Arroyo Hondo; village in municipal district of Guantanamo, province of Santiago.

Arroyo Hondo; barrio in municipal district of Guantanamo, province of Santiago. Population 1,040.

Arroyo Hondo; barrio in municipal district of San Juan y Martinez, province of Pinar del Rio. Population 1,918.

Arroyo Naranjo; village in Habana Province.

Arroyo Naranjo; barrio in municipal district of Habana, province of Habana. Population 1,771.

Arroyo Naranjo; barrio in municipal district of Consolacion del Norte, province of Pinar del Rio.

Arroyon, Arroyo; short right-hand branch of Toa River, in Santiago Province.

Arroyos; barrio and village in municipal district of Mantua, province of Pinar del *Rio.*

Arroyo Vuelta; barrio in municipal district of Jaruco, province of Habana.

Artemisa; municipal district in province of Pinar del Rio. Area 181 square miles. Population 9,317.

Artemisa; city in interior of Pinar del Rio. Population 2,312.

Artemisa; barrio in municipal district of Artemisa, province of Pinar del Rio. Population 4,179.

Arzobispo, Sierra de; hills near northern coast of Habana Province.

Aserradero; village in southern part of municipal district of Cobre, province of Santiago.

Aserradero; barrio in municipal district of Cobre, province of Santiago. Population 459.

Aserradero, Arroyo; stream in southern part of municipal district of Cobre, province of Santiago.

Asiendo, Arroyo del; right-hand branch of Rio Magibacoa, in municipal district of Holguin, province of Santiago.

Asiento; barrio in municipal district of Cuevitas, province of Matanzas. Population 509.

Asiento Viejo; barrio in municipal district of Esperanza, province of Santa Clara. Population 576.

Asuncion; barrio in municipal district of Jovellanos, province of Matanzas. Population 427.

Auras; village on south coast of province of Santa Clara, in municipal district of Cienfuegos.

Auras; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 437.

Auras; barrio in municipal district of Sabanilla, province of Matanzas.

Auras; barrio in municipal district of Holguin, province of Santiago. Population 1,604.

Avalo, Punta; point on southern coast of province of Santa Clara.

Ay, Rio de; right-hand branch of Rio Manati, province of Santa Clara.

Ayala, Rio; river of Habana province, flowing to north coast.

Azul, Arroyo; left-hand branch of Arroyo Negro, in Cienago Zapata, in province of Matanzas.

Azul, Laguna; small lake in western part of province of Santa Clara.

Azules, Punta Los; point on northeast coast of province of Santiago.

Babatuaba, Rio; river flowing to west coast in municipal district of Bayamo, Santiago Province. Length 25 miles.

Babiney; barrio in municipal district of Jiguani, province of Santiago. Population 2,766.

Babiney, Prieto; barrio in municipal district of San Nicolas, province of Habana.

Babuley; village in municipal district of Jiguani, Santiago Province.

Baconao, Rio; river between municipal districts of Guantanamo and Santiago de Cuba, province of Santiago. Length 15 miles.

Baconao, Surgidero de; anchorage on southern coast of province of Santiago.

Bacuino, Rio; small left-hand branch of Rio Zaza, province of Santa Clara.

Bacunagua, Rio; river in province of Pinar del Rio. Heads in Sierra de Limones and flows southeastward to the coast. Length 25 miles.

Bacunaguas; barrio in municipal district of Los Palacios, province of Pinar del Rio.

Bacunayagua; barrio in municipal district of Matanzas, province of Matanzas.

Bacuranao; village in Habana Province.

Bacuranao; barrio in municipal district of Guanabacoa, province of Habana. Population 1,457.

Bacuranao, Rio; river in Habana Province, flowing to the north coast.

Baez; barrio in municipal district of Santa Clara, province of Santa Clara. Population 1,456.

Baez, Lomas de; hills in municipal district of Santa Clara, province of Santa Clara.

Baez, Ensenada de; small bay on northern coast of province of Santiago.

Baez, Punta de; point on north coast of province of Santiago.

Baga; barrio in municipal district of Nuevitas, province of Puerto Principe. Population 277.

Bagaez; barrio in municipal district of Nueva Paz, province of Habana. Population 1,229.

Baguano; village in municipal district of Holguin, province of Santiago.

Baguano, Rio; right-hand branch of Rio Tacajo, in Santiago Province.

Bahia Honda; municipal district in province of Pinar del Rio. Area 286 square miles. Population 2,117.

Bahia Honda; village near north coast in municipal district of Bahia Honda, province of Pinar del Rio.

Bahia Honda; barrio in municipal district of Bahia Honda, province of Pinar del Rio.

Bainoa; municipal district in province of Habana. Area 11 square miles. Population 1,725.

Bainoa; village in Habana Province.

Bainoa; barrio in municipal district of Bainoa, province of Habana.

Bainoa, Arroyo; short left-hand branch of Rio Jiguey, in province of Puerto Principe.

Baiquiri, Arroyo; small stream flowing to coast in municipal district of Santiago de Cuba, province of Santiago.

Baiquiri, Surgidero; anchorage on south coast of municipal district of Santiago de Cuba, province of Santiago.

Baire; village in municipal district of Jiguani, Santiago Province.

Baire; barrio in municipal district of Jiguani, province of Santiago. Population 2,972.

Baire, Arroyo; left-hand branch of Rio Contramaestra, in municipal district of Jiguani, Santiago Province.

Baitiquiri; village in southeastern part of municipal district of Guantanamo, province of Santiago.

Baitiquiri, Punta; point on southern coast of province of Santiago.

Baitiquiri; barrio in municipal district of Guantanamo, province of Santiago. Population 164.

Baja; village near coast in municipal district of Mantua, province of Pinar del Rio.

Baja; barrio in municipal district of Mantua, province of Pinar del Rio. Population 3,741.

Baja, Laguna de; small lake in municipal district of Cienfuegos, southern part of province of Santa Clara.

Baja, Rio de; river flowing to coast in western part of province of Pinar del Rio.

Balboa, Arroyo; small right-hand branch of Arroyo Limpio Grande, in province of Puerto Principe.

Ballenato, Punta; point on north coast of Habana Province.

Bamburanao; barrio in municipal district of Yaguajay, province of Santa Clara. Population 931.

Bamburanao, Sierra de; mountains near north coast in province of Santa Clara.

Banaguises; village in municipal district of San Jose de los Ramos, province of Matanzas.

Banaguises, Pueblo; barrio in municipal district of San Jose de los Ramos, province of Matanzas. Population 931.

Banaguises, Rural; barrio in municipal district of San Jose de los Ramos, province of Matanzas. Population 2,046.

Banao; village on river of same name in province of Santa Clara.

Banao; barrio in municipal district of Sancti Spiritus, province of Santa Clara. Population 436.

Banao, Lomas de; hills in southern part of province of Santa Clara, municipal district of Sancti Spiritus.

Banao, Rio; river flowing to south coast in municipal district of Sancti Spiritus, province of Santa Clara.

Banes; village in eastern part of municipal district of Gibara, province of Santiago.

Banes; village in municipal district of Guanajay, in northern part of province of Pinar del Rio.

Banes; barrio in municipal district of Gibara, province of Santiago. Population 5,730.

Banes; barrio in municipal district of Guayabal, province of Pinar del Rio.

Banes, Bahia de; bay on north coast of province of Santiago.

Banes, Punta; point on north coast of province of Pinar del Rio.

Banes, Rio; short river flowing into bay of same name in northern part of province of Santiago.

Bano; barrio in municipal district of Guantanamo, province of Santiago. Population 838.

Baños; barrio in municipal district of Cartagena, province of Santa Clara.

Banza, Punta; point on north coast of Habana Province.

Baracaldo; barrio and village in municipal district of Santo Domingo, province of Santa Clara.

Baracoa; municipal district in province of Santiago. Area 1,676 square miles. Population 21,944.

Baracoa; city on east coast of province of Santiago. First settlement in Cuba. Population 4,937.

Baracoa; barrio and village in municipal district of Bauta, province of Habana.

Baracoa; barrio in municipal district of San Luis, province of Pinar del Rio. Population 1,085.

Barajagua; barrio in municipal district of Caney, province of Santiago. Population 174.

Barajagua; barrio in municipal district of Mayari, province of Santiago. Population 723.

Barba, Rio; right-hand branch of Toa River, in Santiago Province.

Barbacoa; village in municipal district of San Luis, province of Pinar del Rio.

Barbudo; barrio in municipal district of San Nicolas, province of Habana. Population 736.

Barcos, Ensenada de los; small bay on northwest coast of Isla de Pinos.

Barcos, Punta de los; point on north coast of Isla de Pinos.

Bariai; barrio in municipal district of Gibara, province of Santiago. Population 1,047.

Bariai; village on river of same name in municipal district of Gibara, province of Santiago.

Bariai, Rio; river in municipal district of Gibara, province of Santiago, flowing into Bariai Bay.

Bariai, Ensenada; small bay on north coast of Santiago Province, municipal district of Gibara.

Bariguita, Punta; point on north coast of province of Santiago.

Barlovento, Punta; point on north coast of province of Pinar del Rio, at entrance of Bahia Manel.

Barlovento, Punta; point on north coast of province of Puerto Principe.

Barrancas; town on Rio Buey, in western part of municipal district of Bayamo, province of Santiago.

Barrancas; barrio in municipal district of Bayamo, province of Santiago. Population 1,596.

Barranco, Arroyo de; left-hand branch of Rio Cauto, in municipal district of Jiguani, Santiago Province.

Barrera, Monte; hill near north coast of Habana Province.

Barreto; barrio in municipal district of Managua, province of Habana.

Barricas, Punta; point on north coast of Isla de Pinos.

Barrigones; village in municipal district of Pinar del Rio, province of Pinar del Rio.

Barrigones; barrio in municipal district of San Luis, province of Pinar del Rio. Population 544.

Barrilejo, Arroyo; small right-hand branch of Rio Santa Rosa, in western part of province of Pinar del Rio.

Barro; barrio in municipal district of Cifuentes, province of Santa Clara. Population 279.

Barro, Arroyo; small branch of Rio Agabama, in municipal district of Santa Clara, province of Santa Clara.

Bartola, Lomas la; hills in western part of Holguin, province of Santiago.

Bartolme; village near city of Remedios, in northern part of province of Santa Clara.

Bartolme; barrio in municipal district of San Juan de los Remedios, province of Santa Clara. Population 512.

Bartolo, Loma de; hill in municipal district of Mantua, near west coast of province of Pinar del Rio.

Basilio, Caleta del Tio; cove on north coast of province of Santiago, municipal district of Gibara.

Batabano; municipal district in province of Habana. Area 70 square miles. Population 6,523.

Batabano; barrio and city in municipal district of Batabano, province of Habana. Population 1,025.

Batalla; village in southern part of province of Matanzas.

Batalla; barrio in municipal district of Macuriges, province of Matanzas. Population 795.

Bauta; municipal district in province of Habana. Area 76 square miles. Population 5,142.

Bayamo; municipal district in province of Santiago. Area 1,034 square miles. Population 21,193.

Bayamo; city in interior of Santiago. Population 3,022.

Bayamo, Rio; left-hand branch of Rio Cauto, in southern part of Santiago Province, heading in Sierra Maestra.

Bayatabo, Loma; hill in western part of municipal district of Nuevitas, province of Puerto Principe.

Bayate; barrio and village in municipal district of Candelaria, province of Pinar del Rio.

Bayate, Rio; river flowing to south coast in province of Pinar del Rio.

Bazan; village in northern part of municipal district of Sagua de Tanamo, province of Santiago.

Bazan; barrio in municipal district of Sagua de Tanamo, province of Santiago. Population 781.

Bejucal; municipal district in province of Habana. Area 36 square miles. Population 5,756.

Bejucal; an interior city of Habana Province. Population 4,828.

Bejucal, Sierra del; hills in Habana Province.

Bejuco, Arroyo; left-hand branch of Rio Cauto, municipal district of Mayari, province of Santiago.

Bejuco, Arroyo; stream in western part of municipal district of Puerto Padre, Santiago Province.

Belen; barrio in municipal district of Santiago de Cuba, province of Santiago. Population 6,365.

Belig; town on southwestern coast of province of Santiago, in municipal district of Niquero.

Bellamota; barrio in municipal district of Sancti Spiritus, province of Santa Clara. Population 931.

Beltrami; barrio in municipal district of Bejucal, province of Habana.

Beltran, Loma; hills in municipal district of Guantanamo, province of Santiago.

Berineja, Loma de la; hills near city of Colon, in province of Matanzas.

Bernardino, Arroyo; right-hand branch of Rio Santa Fe, in eastern part of Isla de Pinos.

Bernia; village in municipal district of San Jose de las Yeras, province of Santa Clara.

Bernia; barrio in municipal district of San Juan de las Yeras, province of Santa Clara. Population 613.

Bermeja; barrio in municipal district of Cabezas, province of Matanzas. Population 1,871.

Berraco, Punta; point on southern coast of province of Santiago, municipal district of Santiago de Cuba.

Berraco, Rio; river flowing to north coast of municipal district of Sagua de Tanamo, province of Santiago.

Berracos; barrio in municipal district of Consolacion del Norte, province of Pinar del Rio. Population 1,056.

Berracos, Punta; point on north coast of province of Pinar del Rio.

Biajacas, Arroyo; small right-hand branch of Rio Muñoz, in province of Puerto Principe.

Biajacas, Arroyo; right-hand branch of Arroyo Curajaya, in southern part of province of Puerto Principe.

Biajacas, Ensenada; small bay on west coast of province of Pinar del Rio.

Biajacas, Rio; river flowing to coast in western part of province of Pinar del Rio.

Biaro, Punta; point on north coast of province of Puerto Principe.

Biaya, Sierra de; mountains in southern part of municipal district of Puerto Principe, province of Puerto Principe.

Bibijagua, Punta de la; point on north coast of Isla de Pinos.

Bicana; town on west coast of province of Santiago, municipal district of Manzanillo.

Bicana, Rio; river flowing to west coast in municipal district of Manzanillo, Santiago Province.

Bija; barrio in municipal district of Cabezas, province of Matanzas. Population 751.

Bija, Rio; river in Habana Province.

Bijaru; village in municipal district of Holguin, province of Santiago.

Bijaru; barrio in municipal district of Holguin, province of Santiago. Population 2,152.

Bijaru, Loma de; hills in municipal district of Holguin, province of Santiago.

Bijaru, Rio; left-hand branch of Tajacon River, in municipal district of Holguin, province of Santiago.

Bio, Rio; right-hand branch of Rio Cauto, in municipal district of Mayari, province of Santiago.

Birama, Lagunas de; small lakes in western part of municipal district of Puerto Padre, province of Santiago.

Birama, Rio; right-hand tributary of Rio Cauto, in Santiago province. Length 30 miles.

Biran; barrio in municipal district of Mayari, province of Santiago. Population 529.

Blanca, Arroyo; branch of Arroyo del Mulato in municipal district of Puerto Principe, province of Puerto Principe.

Blanca, Laguna; small lake in western part of municipal district of Holguin, province of Santiago.

Blanca, Punta; point on northern coast of Isla de Turiguano, province of Puerto Principe.

Blanca, Punta; point on island of Conuco, north of province of Santa Clara.

Blanco, Arroyo; left-hand branch of Rio los Perros, near north coast of Puerto Principe.

Blanco, Arroyo; small branch of Rio Salado, in municipal district of Holguin, province of Santiago.

Blanco, Cabo; cape on west coast of province of Santiago.

Blanco, Caleton; cove on coast of municipal district of Cobre, southern part of province of Santiago.

Blanco, Cayo; islet off south coast of municipal district of Trinidad, province of Santa Clara.

Blanco, Cayo; islet off south coast of province of Santa Clara, municipal district of Sancti Spiritus.

Blanco, Cayo; islet off north coast of province of Pinar del Rio.

Blanco, Cayos; islands north of province of Matanzas.

Blanco del Sur, Cayo; island off south coast of province of Santa Clara.

Blanco, Monte; hill on north coast in Habana Province.

Blanco, Pico; peak near south coast in municipal district of Cienfuegos, province of Santa Clara.

Blanco, Rio; river in western part of province of Matanzas.

Blanco, Rio; short right-hand branch of Rio Yaleras, province of Santiago.

Blanco, Rio; branch of Rio Jaruco in Habana Province.

Blanquisal; town on western coast of Santiago Province, in municipal district of Manzanillo.

Blanquisal; barrio in municipal district of Manzanillo, province of Santiago. Population 1,040.

Blanquizar, Arroyo; short branch of Arroyo de la Vaca in province of Puerto Principe.

Blanquizar; hills in northern part of Puerto Padre, province of Santiago.

Bobo, Punto and Arroyo; point and creek on north coast of Isla de Pinos.

Boca; barrio in municipal district of Mariel, province of Pinar del Rio.

Boca de Jaruco; village in Habana Province, on north coast.

Boca de Santa Cruz; village on north coast of Habana Province.

Bocas; barrio in municipal district of Gibara, province of Santiago.

Bolanos, Montes de; mountains in municipal district of Alto Songo, province of Santiago.

Bolija; village in municipal district of Cobre, province of Santiago.

Bolondron; municipal district in province of Matanzas. Area 267 square miles. Population 9,179.

Bolondron; an interior city of Matanzas. Population 2,604.

Boniato; village in municipal district of Alto Songo, province of Santiago.

Bonito, Cayo; islet south of province of Santa Clara.

Boquerones, Arroyo; branch of Rio Santo Domingo in province of Matanzas.

Borigo, Arroyo; left-hand branch of Rio Contramaestra in municipal district of Jiguani, province of Santiago.

Borroto, Lomas de; hills in Habana Province.

Borton, Punta; point on west coast of municipal district of Niquero, province of Santiago.

Bosque; village in municipal district of San Antonio de las Vueltas, province of Santa Clara.

Bosque; barrio in municipal district of San Antonio de las Vueltas, province of Santa Clara. Population 2,019.

Botija; barrio in municipal district of Cobre, province of Santiago. Population 324.

Botija, Arroyo la; small left-hand branch of Rio Manati, province of Santa Clara.

Boyeros; barrio in municipal district of Santiago de las Vegas, province of Habana. Population 1,553.

Braguetudos; barrio in municipal district of Mayari, province of Santiago. Population 1,454.

Brama, Rio; short river flowing to coast in municipal district of Niquero, Santiago Province.

Brava, Punta; point on north coast of Santiago Province, municipal district of Gibara.

Brava, Punta; point on north coast of Santiago Province.

Brava, Punta; point on north coast of province of Puerto Principe.

Brava, Punta; point on south coast of municipal district of Niquero, province of Santiago.

Brava, Punta; point on south coast of Isla de Pinos.

Brazo Cauto; barrio in municipal district of Cobre, province of Santiago. Population 1,150.

Brazo, Arroyo del; left-hand branch of Rio Los Perros, near north coast of province of Puerto Principe.

Brazo de Abajo; short branch of Rio Turquina in province of Santiago.

Brazo del Pinal; small stream uniting with Brazo Seco to form Toa River in Santiago Province.

Brazo Izquierdo; short branch of Rio Turquina in municipal district of Bayamo, province of Santiago.

Brazo Seco; small stream uniting with Brazo del Pinal to form Toa River in Santiago Province.

Broa, Ensenada de; bay on south coast, touching provinces of Habana, Matanzas and Santa Clara.

Brujo, Lomas del; hills in northern part of province of Pinar del Rio.

Buena Esperanza, Bahia; bay in southern part of island, west of province of Santiago.

Buenaventura; town near southern coast in province of Puerto Principe, municipal district of Santa Cruz del Sur.

Buenaventura; village in Habana Province.

Buenaventura; barrio in municipal district of Santa Cruz del Sur, province of Puerto Principe. Population 352.

Buenavista; village in municipal district of San Juan de los Remedios, northern part of province of Santa Clara.

Buenavista; village in municipal district of Macagua, province of Matanzas.

Buenavista; barrio in municipal district of San Juan de los Remedios, province of Santa Clara. Population 4,071.

Buenavista, Rio; river flowing to western coast in province of Pinar del Rio.

Buenavista, Cayo de; island west of province of Pinar del Rio.

Buenavista, Punta de; point on west coast of Isla de Pinos.

Buenos Aires, Lomas; hills in municipal district of Pinar del Rio, province of Pinar del Rio.

Buey, Rio; river flowing to west coast in Santiago Province.

Buey, Ensenada de; small bay on west coast of province of Santiago, municipal district of Bayamo.

Bueycito; barrio and village in municipal district of Bayamo, province of Santiago. Population of barrio 1,590.

Bufeo, Laguna del; lake in municipal district of Guane, southern part of province of Pinar del Rio.

Bufeo, Punta del; point on east coast of province of Santiago.

Buiquiri; village in municipal district of Santiago de Cuba, province of Santiago.

Burro, Arroyo del; right-hand branch of Rio Santa Barbara in province of Matanzas.

Burro, Cayo; islet off north coast of municipal district of Baracoa, province of Santiago.

Burro, Lomas del; hills near south coast in municipal district of Trinidad, province of Santa Clara.

Cabacu; barrio in municipal district of Baracoa, province of Santiago. Population 715.

Cabagan; village on south coast of municipal district of Trinidad, province of Santa Clara.

Cabagan; barrio in municipal district of Trinidad, province of Santa Clara. Population 762.

Cabagan, Lomas de; hills in southern part of province of Santa Clara, municipal district of Trinidad.

Cabagan, Rio; river flowing to southern coast in municipal district of Trinidad, province of Santa Clara.

Cabaiguan; village in municipal district of Sancti Spiritus, province of Santa Clara.

Cabaiguan; barrio in municipal district of Sancti Spiritus, province of Santa Clara. Population 1,135.

Caballero, Rio; right-hand branch of Rio Tayaba, in southern part of province of Santa Clara.

Caballos, Punta; point on south coast of Habana Province.

Caballos, Sierra de; mountains in northern part of Isla de Pinos.

Cabañas; municipal district in province of Pinar del Rio. Area 89 square miles. Population 3,853.

Cabañas; barrio in municipal district of Cabañas, province of Pinar del Rio.

Cabañas, Bahia; bay on north coast of province of Pinar del Rio.

Cabañas, Punta; point on northeast coast of municipal district of Sagua de Tanamo, province of Santiago.

Cabañas, Surgidero de; anchorage on coast of municipal district of Cobre, southern part of Santiago Province.

Cabezadas de Arroyo; spur of Sierra Maestra, province of Santiago.

Cabeza del Cerro, Punta; point on north coast of province of Santiago.

Cabeza del Muerto; hills near southern coast in province of Santa Clara.

Cabeza de Vaca, Punta; point on north coast of Habana province.

Cabezas; municipal district in province of Matanzas. Area 96 square miles. Population 5,184.

Cabezas; an interior city of Matanzas. Population 1,721.

Cabezas; barrio in municipal district of Mantua, province of Pinar del Rio.

Cabezas; barrio and village in municipal district of Pinar del Rio, province of Pinar del Rio. Population of barrio 1,521.

Cabezas, Valle de; valley in Sierra Organos, municipal district of Pinar del Rio, province of Pinar del Rio.

Cabezos, Cayo de las; islet north of province of Santa Clara.

Cabezuela, Rio; short branch of Rio Salado, in municipal district of Holguin, province of Santiago.

Cabo Cruz; barrio in municipal district of Niquero, province of Santiago.

Cabo de San Antonio; barrio in municipal district of Guane, province of Pinar del Rio. Population 270.

Cabonico; village in municipal district of Mayari, province of Santiago.

Cabonico; barrio in municipal district of Mayari, province of Santiago. Population 683.

Cabras, Cerro de; hill in municipal district of Pinar del Rio, province of Pinar del Rio.

Cabrera, Punta; point on south coast of Santiago, municipal district of Cobre.

Cabreras, Rio; river heading in Loma de Ajenjibre and flowing north between the provinces of Santiago and Puerto Principe to coast. Length 35 miles.

Cabriales; barrio in municipal district of Guanajay, province of Pinar del Rio. Population 533.

Cacao, Cayo; islet south of province of Santa Clara.

Cacarajicaras; village in municipal district of Bahia Honda, northern part of province of Pinar del Rio.

Cacarajicaras, Sierra de; mountains in northern part of province of Pinar del Rio.

Cacarrala, Sierra de; mountains in western part of province of Puerto Principe.

Cacocum; village in municipal district of Holguin, province of Santiago.

Cacuyaguin, Rio; river in northern part of province of Santiago, flowing to coast through municipal district of Gibara.

Caguaguas; barrio in municipal district of Quemado de Guines, province of Santa Clara. Population 540.

Caguanes, Arroyo; small left-hand branch of Rio Caguanes in northern part of province of Santa Clara.

Caguanes, Punta; point on northern coast of province of Santa Clara.

Caguanes, Rio; river flowing to north coast in municipal district of Yaguajay, province of Santa Clara.

Caguanes, Rio; stream flowing to coast in northeastern part of province of Santa Clara.

Caguanes, Sierra de; mountains on north coast of province of Santa Clara, municipal district of Yaguajay.

Cagunigua, Rio; stream in northern part of municipal district of Baracoa, province of Santiago.

Caibarien; municipal district in province of Santa Clara. Area 55 square miles. Population 8,650.

Caibarien; city on north coast of province of Santa Clara. Population 7,013.

Caibarien; barrio in municipal district of Caibarien, province of Santa Clara. Population 7,013.

Caiguanabo; barrio in municipal district of Consolacion del Norte, province of Pinar del Rio. Population 439.

Caiguanabo, Rio; river flowing to south coast in province of Pinar del Rio. Length 22 miles.

Caiman, Cayo; small island north of Cayo Romano, province of Puerto Principe.

Caiman, Punta; point on north coast of province of Pinar del Rio.

Caimanera; village in municipal district of Cienfuegos, province of Santa Clara.

Caimanera; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 717.

Caimanera; barrio in municipal district of Guantanamo, province of Santiago. Population 620.

Caimanera, Ensenada; small bay on west coast of municipal district of Manzanillo, province of Santiago.

Caimanera, Punta; point on west coast of municipal district of Manzanillo, Santiago Province.

Caimanes; village in municipal district of Cobre, province of Santiago.

Caimanes; barrio in municipal district of Cobre, province of Santiago. Population 698.

Caimasan, Arroyo; branch of Arroyo los Pasos, in municipal district of Holguin, province of Santiago.

Caimiabo, Rio; river flowing to south coast in province of Santa Clara. Length 20 miles.

Caimito; village in municipal district of Consolacion del Sur, province of Pinar del Rio.

Caimito; barrio in municipal district of Guayabal, province of Pinar del Rio. Population 1,269.

Caimito; barrio in municipal district of San Nicolas, province of Habana.

Caimitos; barrio in municipal district of Consolacion del Sur, province of Pinar del Rio.

Cajio; barrio in municipal district of Guira de Melena, province of Habana. Population 963.

Cajon, Punta del; point on north coast of San Antonio peninsula, province of Pinar del Rio.

Cajuare, Punta; point on north coast of province of Santiago.

Calabaza, Arroyo; small stream in municipal district of Holguin, province of Santiago.

Calabazar; municipal district in province of Santa Clara. Area 279 square miles. Population 13,419.

Calabazar; an interior city of Santa Clara. Population 1,575.

Calabazar; village in municipal district of Holguin, Santiago Province.

Calabazar; village in Habana Province.

Calabazar; barrio in municipal district of Jiguani, province of Santiago. Population 655.

Calabazar; barrio in municipal district of Santiago de las Vegas, province of Habana. Population 1,152.

Calabazar, Arroyo; small branch of Arroyo del Lindero, province of Puerto Principe.

Calabazas; barrio in municipal district of Sagua de Tanamo, province of Santiago Population 952.

Calabazas, Rio; right-hand branch of Rio Zaza, province of Santa Clara.

Calazo; village in western part of municipal district of Sagua de Tanamo, province of Santiago.

Caldera, Punta de la; point on north coast of Isla de Turiguano, province of Puerto Principe.

Calderon; village in municipal district of Holguin, Santiago Province.

Caleta, Punta; point on north coast of Santiago Province, municipal district of Gibara.

Caleta, Punta de; point on southeast coast of province of Santiago.

Caleta Grande; barrio in municipal district of Isla de Pinos, province of Habana. Population 315.

Calicito; town near west coast of province of Santiago, municipal district of Manzanillo.

Calicito; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 499.

Calicitos; barrio in municipal district of Manzanillo, province of Santiago. Population 738.

Calienta Rabo, Lomas; hills in municipal district of Bahia Honda, province of Pinar del Rio.

Calimete; village in municipal district of Colon, province of Matanzas.

Calimete; barrio in municipal district of Colon, province of Matanzas. Population 3,274.

[illegible], **Surgidero de**; anchorage on coast of municipal district of Cobre, southern part of province of Santiago.

Callejon, Rio del; left-hand branch of Rio de las Nuevas, Isla de Pinos.

Calvario; barrio in municipal district of Habana, province of Habana. Population 1,041.

Calzada; barrio in municipal district of Santa Cruz del Sur, province of Puerto Principe.

Calzoncillo, Alto del; hills in northern part of municipal district of Mayari, province of Santiago.

Camacho, Arroyo; right-hand branch of Rio Piedras, in northern part of province of Matanzas.

Camacho, Punta de; point on north coast of province of Matanzas.

Camajan, Loma de; hills in western part of municipal district of Nuevitas, province of Puerto Principe.

Camajan, Rio; left-hand branch of Rio Bariai, in municipal district of Gibara, province of Santiago.

Camajuani; municipal district in province of Santa Clara. Area 100 square miles. Population 14,495.

Camajuani; an interior city of Santa Clara. Population 5,082.

Camajuani, Rio; right-hand branch of Rio Sagua la Chica, in province of Santa Clara.

Camarones; village in municipal district of Guantanamo, province of Santiago.

Camarones; barrio in municipal district of Consolacion del Sur, province of Pinar del Rio.

Camarones; barrio in municipal district of Guantanamo, province of Santiago. Population 757.

Camarones, Rio; left-hand branch of Rio San Anton in province of Matanzas.

Camarones, Rio; river flowing to west coast in province of Pinar del Rio.

Camarones, Rio; right-hand branch of Rio Sagua la Chica, in province of Santa Clara.

Camasan; barrio in municipal district of Holguin, province of Santiago. Population 1,257.

Camasan; village in municipal district of Holguin, province of Santiago.

Cambute; barrio in municipal district of Santa Maria del Rosario, province of Habana.

Camejo, Arroyo; right-hand branch of Arroyo Guarano del Brazo in province of Puerto Principe.

Camoa, Loma; hill in Habana Province.

Campa, Arroyo; small coast stream in municipal district of Cabairien, northern part of province of Santa Clara.

Campana; village and barrio in municipal district of Matanzas, province of Matanzas.

Campana, Lomas la; hills in western part of municipal district of Moron, province of Puerto Principe.

Campanarios, Punta de; point on Zapata Peninsula, south coast of province of Santa Clara.

Campantaros, Arroyo; an outlet of lake of same name flowing to south coast in province of Pinar del Rio.

Campantarras, Laguna; small lake in municipal district of Pinar del Rio, province of Pinar del Rio.

Campechuela; municipal district in province of Santiago. Area 51 square miles. Population 7,369.

Campechuela; city on south coast of province of Santiago. Population 3,254.

Campo Florido; village in Habana Province.

Campo Florido; barrio in municipal district of Guanabacoa, province of Habana. Population 591.

Campos, Cayos; small islands east of Isla de Pinos.

Caña; village near coast in municipal district of Manzanillo, province of Santiago.

Caña, Ensenada de la; small bay on west coast of province of Pinar del Rio.

Caña, Punta de; point on north coast of Santiago Province.

Caña, Rio; left-hand branch of Jauco River in eastern part of Santiago Province.

Cañada, Sierra de la; mountains in western part of Isla de Pinos.

Canal Nuevo, Cayos de; small islands north of province of Puerto Principe.

Cañanas, Rio; small river in western part of Matanzas.

Cañanoba, Rio; stream in municipal district of Sagua de Tanamo, province of Santiago, flowing to north coast.

Cañanoba, Ensenada; small bay on north coast of municipal district of Sagua de Tanamo, province of Santiago.

Canapu, Rio; right-hand branch of Rio Nipe, in Santiago Province.

Canarioco; barrio in municipal district of Matanzas, province of Matanzas. Population 814.

Cañas; barrio in municipal district of Artemisa, province of Pinar del Rio. Population 984.

Cañas, Loma de las; hill in municipal district of San Juan y Martinez, province of Pinar del Rio.

Cañas, Punta de; point on north coast of province of Santiago.

Cañas, Rio; right-hand branch of Rio Limones in northern part of province of Santa Clara.

Cañas, Rio; right-hand branch of Rio Cauto, in southern part of province of Santiago.

Cañas, Rio Las; stream flowing to south coast in municipal district of Trinidad, province of Santa Clara.

Canasi; municipal district in province of Matanzas. Area 62 square miles. Population 1,993.

Canasta, Arroyo; right-hand branch of Rio San Felipe, southern part of province of Pinar del Rio.

Canasta, Lomas de la; hills in western part of municipal district of Guantanamo, province of Santiago.

Candela Norte; barrio in municipal district of Guines, province of Habana.

Candela Sur; barrio in municipal district of Guines, province of Habana.

Candela, Lomas de; hills in Habana Province.

Candela, Baja; barrio in municipal district of Guines, province of Habana.

Candelaria; municipal district in province of Pinar del Rio. Area 203 square miles. Population 4,866.

Candelaria; village in municipal district of Gibara, province of Santiago.

Candelaria; barrio in municipal district of Gibara, province of Santiago. Population 436.

Candelaria; barrio in municipal district of Candelaria, province of Pinar del Rio. Population 1,697.

Candelaria, Cerro de; mountain in northern part of municipal district of Gibara, province of Santiago.

Canete; village in northern part of municipal district of Baracoa, province of Santiago.

Canete; barrio in municipal district of Baracoa, province of Santiago. Population 322.

Caney; municipal district in province of Santiago. Area 201 square miles. Population 9,126.

[illegible]ey; barrio in municipal district of Caney, province of Santiago. Population 844.

Caney, Punta del; point on south coast of province of Santa Clara.

Cangre; village in municipal district of Pinar del Rio, province of Pinar del Rio.

Cangre; barrio in municipal district of Pinar del Rio, province of Pinar del Rio. Population 4,208.

Cangrejeras; village in Habana Province.

Cangrejeras; barrio in municipal district of Bauta, province of Habana.

Cangrejo; barrio in municipal district of San Juan de los Remedios, province of Santa Clara.

Cangrejo, Rio; small branch of Rio Manati, in municipal district of Trinidad, province of Santa Clara.

Canimar; barrio in municipal district of Guamacaro, province of Matanzas. Population 161.

Canimar; barrio in municipal district of Matanzas, province of Matanzas.

Canimar; barrio in municipal district of Sabanilla, province of Matanzas.

Canizo, Rio; small stream flowing to coast in municipal district of Cobre, province of Santiago.

Cano; municipal district in province of Habana. Area 26 square miles. Population 4,210.

Cano; barrio in municipal district of Cano, province of Habana.

Cano; barrio in municipal district of Manzanillo, province of Santiago. Population 1,112.

Canoa; barrio in municipal district of Managua, province of Habana.

Canoa, Punta de la; point on south coast of Isla de Pinos.

Canoa, Sierra de la; mountains in northeastern part of province of Santa Clara, municipal district of Yaguajay.

Canoa, Loma; hill in western part of province of Puerto Principe, municipal district of Ciego de Avila.

Cañones, Punta; point on east coast of municipal district of Gibara, province of Santiago.

Canongo; village in northern part of province of Matanzas.

Cantel; barrio in municipal district of Cardenas, province of Matanzas.

Cantimplora; village in municipal district of Gibara, province of Santiago.

Cantimplora; barrio in municipal district of Gibara, province of Santiago. Population 515.

Caobas; town in western part of municipal district of Bayamo, province of Santiago.

Caobas; village in municipal district of Guamacaro, province of Matanzas.

Caobas; barrio in municipal district of Guamacaro, province of Matanzas. Population 1,197.

Caobas, Loma Las; hills in northern part of Santiago Province, near coast.

Caobas, Sierra de; mountains in western part of province of Matanzas.

Caobillas; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 1,728.

Capado, Punta del; point on west coast of Isla de Pinos.

Capellanias; barrio in municipal district of Artemisa, province of Pinar del Rio. Population 223.

Capellanias; barrio in municipal district of Ceiba del Agua, province of Habana.

Caperuza; barrio in municipal district of Consolacion del Sur, province of Pinar del Rio.

Capitana, Punta; point on south coast of province of Pinar del Rio.

Capote; barrio in municipal district of Santa Maria del Rosario, province of Habana.

Caraballo; village in Habana province.

Caraballo; barrio in municipal district of Bainoa, province of Habana. Population 495.

Caraballo; village in municipal district of San Diego de los Baños, province of Pinar del Rio.

Caracusey; village in municipal district of Trinidad, province of Santa Clara.

Caracusey; barrio in municipal district of Trinidad, province of Santa Clara. Population 676.

Carácusey, Rio; left-hand branch of Rio Manati, province of Santa Clara.

Carahates; village near north coast in municipal district of Quemado de Guines, province of Santa Clara.

Carahates; barrio in municipal district of Quemado de Guines, province of Santa Clara. Population 1,615.

Carambola; village and barrio in municipal district of Candelaria, province of Pinar del Rio.

Carapachivey, Caleta; small bay on south coast of Isla de Pinos.

Carapacho, Punta; point on south coast of province of Puerto Principe, municipal district of Moron.

Caravela Grande; point on north coast of San Antonio Peninsula, province of Pinar del Rio.

Caravelas, Rio de las; river in province of Puerto Principe. Heads in Yucatan hills and flows northeast to coast. Length 28 miles.

Carboneras; barrio in municipal district of Santa Cruz del Norte, province of Habana.

Cardenas; municipal district in province of Matanzas. Area 56 square miles. Population 24,861.

Cardenas; city on north coast of province of Matanzas. Population 21,940.

Cardenas, Bahia; bay on north coast of province of Matanzas.

Careges, Arroyo; right-hand branch of Yumuri River in Santiago Province.

Carena, Cayo; islet south of province of Santa Clara.

Carenero, Cayo; island north of province of Santa Clara.

Caribo, Punta; point on south coast of province of Pinar del Rio.

Caridad; village in municipal district of Guantanamo, province of Santiago.

Caridad; village in municipal district of Holguin, province of Santiago.

Caridad; barrio in municipal district of Guantanamo, province of Santiago. Population 516.

Carlos Maria, Laguna; lake near north coast in province of Santa Clara, municipal district of Calabazar.

Carlos Rojas; municipal district in province of Matanzas. Area 71 square miles. Population 3,174.

Carlota, Monte la; hill in Habana Province.

Carmen; barrio in municipal district of Santa Clara, province of Santa Clara. Population 3,051.

Carmen, Lomas del; hills in Habana Province.

Carolina; barrio in municipal district of San Juan de los Remedios, province of Santa Clara. Population 358.

Carraguao, Punta de; point on south coast of province of Pinar del Rio.

Carrasco, Lomas de; hills in Habana Province.

Carrasco, Rio; river in province of Puerto Principe. Heads in Sierra de Najasa and flows southeastward to coast. Length 35 miles.

Carrederias; barrio in municipal district of Santa Cruz del Norte, province of Habana.

Cartagena; municipal district in province of Santa Clara. Area 180 square miles. Population 6,244.

Cartagena; barrio in municipal district of Cartagena, province of Santa Clara. Population 1,917.

Cartas, Punta de; point on south coast of province of Pinar del Rio.

Casas, Laguna las; small lake near coast in municipal district of Guane, province of *Pinar* del Rio.

Cascajal; barrio in municipal district of Cartagena, province of Santa Clara. Population 2,017.

Cascorro; town in municipal district of Puerto Principe, province of Puerto Principe.

Cascorro; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 1,904.

Cascorro, Rio; river in province of Puerto Principe. Heads in Loma de Sibanicu and flows northeast to coast. Length 30 miles.

Casiguas; municipal district in province of Habana. Area 22 square miles. Population 1,004.

Casiguas; village in Habana Province.

Casiguas, Cayo; small island north of province of Pinar del Rio.

Casilda; village near city of Trinidad, on south coast of province of Santa Clara.

Casilda; barrio in municipal district of Trinidad, province of Santa Clara. Population 2,234.

Casilda, Punta; point on south coast of province of Santa Clara.

Casimba; barrio in municipal district of Guatanamo, province of Santiago. Population 537.

Casimba Arriba; village in northern part of municipal district of Guantanamo, province of Santiago.

Casimba, Punta; point on southwest coast of province of Santiago.

Caisimu; barrio in municipal district of Puerto Padre, province of Santiago. Population 1,653.

Casisey; village in municipal district of Guantanamo, province of Santiago.

Casisey Abajo; village in municipal district of Guantanamo, province of Santiago.

Casisey Abajo; barrio in municipal district of Guantanamo, province of Santiago. Population 508.

Casisey Arriba; barrio in municipal district of Guantanamo, province of Santiago. Population 443.

Castal, Lomas del; hills in western part of province of Puerto Principe, municipal district of Ciego de Avila.

Castillo; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 1,383.

Castro, Rio; river in municipal district of Sagua de Tanamo, province of Santiago.

Catal, Arroyo; small left-hand branch of Rio Cauto, province of Santiago.

Catalina; municipal district in province of Habana. Area 92 square miles. Population 2,718.

Catalina; village and barrio in municipal district of Guane, province of Pinar del Rio.

Catedral; barrio in municipal district of Santiago de Cuba, province of Santiago. Population 5,152.

Caunao; village near city of Cienfuegos, in southern part of province of Santa Clara.

Caunao; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 3,597.

Caunao, Arroyo; small left-hand branch of Rio Zaza, in municipal district of Sancti Spiritus, province of Santa Clara.

Caunao, Lagunas de; chain of small lakes near north coast of province of Santa Clara, in municipal district of Calabazar.

Caunao, Loma; hills in northern part of municipal district of Puerto Principe, province of Puerto Principe.

Caunao, Punta; point on north coast of province of Puerto Principe.

Caunao, Rio; river rising in western part of municipal district of Puerto Principe, province of Puerto Principe, and flowing northwestward and northward to coast. Length 55 miles.

Caunao, Rio; left-hand branch of Rio Zaza in northern part of province of Sant Clara.

Caunao, Rio; river flowing into Cienfuegos Bay, in province of Santa Clara.

Cautillo, Rio; a tributary of the Cauto River, forming a dividing line between municipal districts of Jiguani and Bayamo in Santiago Province for a distance of about 35 miles.

Cauto Embarcadero; town at head of navigation on Rio Cauto, in municipal district of Bayamo, province of Santiago.

Cauto, Lagunas de; small lakes in northern part of municipal district of Jiguani, Santiago Province.

Cauto, Rio; longest and most important river in Cuba. Heads in the northern slopes of Sierra Maestra, in southern part of Santiago Province, and flows north and west into Gulf of Buena Esperanza. It is 150 miles in length, and navigable to Cauto Embarcadero, a distance of 50 miles from its mouth.

Cauto Abajo; village in municipal district of Palma Soriano, province of Santiago.

Cauto Abajo; barrio in municipal district of Palma Soriano, province of Santiago. Population 839.

Cauto Baire; village in municipal district of Palma Soriano, province of Santiago.

Cauto Baire; barrio in municipal district of Palma Soriano, province of Santiago. Population 777.

Cauto del Embarcadero; barrio in municipal district of Bayamo, province of Santiago. Population 1,571.

Cauto del Paso; barrio in municipal district of Puerto Padre, province of Santiago. Population 1,500.

Cayaguaneque, Arroyo; small stream flowing to north coast of municipal district of Baracoa, province of Santiago.

Cayaguani, Arroyo; left-hand branch of Rio Manati, province of Santa Clara.

Cayajabas, Laguna; small lake in San Antonio peninsula, province of Pinar del Rio.

Cayajabos; village in municipal district of Artemisa, province of Pinar del Rio.

Cayajabos; barrio in municipal district of Artemisa, province of Pinar del Rio. Population 1,022.

Cayajabos; barrio in municipal district of Madruga, province of Habana.

Cayajana, Rio; right-hand branch of Rio Zaza, province of Santa Clara.

Cayajo, Rio; right-hand branch of Rio Cauto, in western part of Santiago Province.

Cayama, Lagunas de; small lakes in municipal district of Ceja de Pablo, province of Santa Clara.

Cayamas, Arroyo; small stream on eastern coast of Isla de Pinos.

Cayamas, Punta de; point on south coast of Habana Province.

Cayos; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 113.

Cayos; barrio in municipal district of San Antonio de las Vueltas, province of Santa Clara.

Cayos de San Felipe; barrio in municipal district of Viñales, province of Pinar del Rio. Population 417.

Cayo Smith; village in municipal district of Cobre, province of Santiago.

Cayo Smith; barrio in municipal district of Cobre, province of Santiago. Population 265.

Cayuelos, Punta de los; point on south coast of province of Pinar del Rio.

Cayuelos, Punta de los; point on western coast of San Antonio peninsula, province of Pinar del Rio.

Cayueto, Punta; point on north coast of Santiago Province.

Cazenal, Punta; point on south coast of municipal district of Santiago de Cuba, province of Santiago.

Cazones, Ensenada de; bay on south coast of province of Santa Clara.

Cazuelas, Loma las; hill in municipal district of Pinar del Rio, province of Pina del Rio.

Cebollas, Punta; point on north coast of municipal district of Sagua de Tanamo, province of Santiago.

Cedran Tormenta; spur of Sierra Maestra in province of Santiago.

Cedro, Punta del; point on north coast of province of Santa Clara.

Ceiba; town in southern part of province of Puerto Principe, municipal district of Ciego de Avila.

Ceiba; barrio in municipal district of Cabanas, province of Pinar del Rio. Population 1,366.

Ceiba; barrio in municipal district of Ciego de Avila, province of Puerto Principe. Population 203.

Ceiba, Arroyo de la; small branch of Arroyo de la Vaca in province of Puerto Principe.

Ceiba del Agua; municipal district in province of Habana. Area 34 square miles. Population 2,197.

Ceiba del Agua; barrio in municipal district of Ceiba del Agua, province of Habana. Population 909.

Ceiba del Agua; village in Habana Province.

Ceiba Hueca; barrio in municipal district of Campechuela, province of Santiago. Population 2,149.

Ceiba Mocha; barrio and village in municipal district of Matanzas, province of Matanzas. Population of barrio 1,828.

Ceja Borrejo, Arroyo; right-hand branch of Rio Yaguarama in southern part of province of Santa Clara.

Ceja de Anton, Arroyo; small stream flowing to west coast in province of Pinar del Rio.

Ceja de la Herradura; barrio in municipal district of Julian Diaz, province of Pinar del Rio.

Ceja de Pablo; municipal district in province of Santa Clara. Area 337 square miles. Population 6,954.

Ceja de Pablo; barrio in municipal district of Ceja de Pablo, province of Santa Clara. Population 273.

Ceja de Pablo; barrio in municipal district of San Antonio de las Vueltas, province of Santa Clara. Population 1,545.

Cenicero, Arroyo; small stream in municipal district of Puerto Padre, Santiago Province.

Centano; barrio in municipal district of Yaguajay, province of Santa Clara. Population 447.

Centeno, Arroyo; small stream in Santiago Province, flowing into Bahia de Nipe.

Centeno, Laguna; small lake in municipal district of Mayari, province of Santiago.

Central Redencion; town in municipal district of Nuevitas, province of Puerto Principe.

Centro; barrio in municipal district of Calabazar, province of Santa Clara. Population 3,756.

Centro; barrio in municipal district of San Diego del Valle, province of Santa Clara. Population 1,298.

Centro; barrio in municipal district of Santa Isabel de las Lajas, province of Santa Clara. Population 6,915.

Cerillo, Punta del; point on north coast of Isla de Turiguano, province of Puerto Principe.

Cerrito; barrio in municipal district of Santo Domingo, province of Santa Clara.

Cervantes; village in Habana Province.

Cervantes; village in municipal district of Perico, province of Matanzas.

Cervantes, Lomas de; hills in Habana Province.

Chamarreta Punta; point on the south coast of municipal district of Manzanillo, Santiago Province.

Chambas; town in northwestern part of province of Puerto Principe, municipal district of Moron.

Chambas; barrio in municipal district of Moron, province of Puerto Principe. Population 925.

Chambas, Rio de las; river in province of Puerto Principe. It heads in hills in western part of municipal district of Moron and flows north to the sea. It is known for some distance from its mouth as Los Perros. Length 27 miles.

Chaparra; barrio in municipal district of Puerto Padre, province of Santiago. Popu- 1,038.

Charcas; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 736.

Charcas, Punta; point on south coast of province of Puerto Principe, municipal district of Moron.

Charco Hondo; barrio in municipal district of San Antonio de las Vueltas, province of Santa Clara. Population 1,013.

Chavaleta; barrio in municipal district of Mayari, province of Santiago. Population 1,230.

Chavez; barrio in municipal district of Rancho Veloz, province of Santa Clara. Population 1,156.

Chavez; barrio in municipal district of San Jose de las Lajas, province of Habana.

Chepalope, Arroyo; branch of Rio Almendares in Habana Province.

Chepalope, Loma; hill in Habana Province.

Chicaro; barrio in municipal district of San Antonio de los Baños, province of Habana. Population 404.

Chicharron; barrio in municipal district of Ceiba del Agua, province of Habana.

Chico, Arroyo; left-hand branch of Rio San Felipe in southern part of province of Pinar del Rio.

Chimborazo, Loma del; hill in Habana province.

Chinchila; barrio in municipal district of Sagua la Grande, province of Santa Clara. Population 1,654.

Chiquito, Arroyo; short left-hand branch of Rio de las Caravelas in municipal district of Puerto Principe, province of Puerto Principe.

Chirigota; village in municipal district of San Cristobal, province of Pinar del Rio.

Chirima, Surgidero; anchorage on coast of municipal district of Cobre, southern part of Santiago Province.

Chirino; barrio in municipal district of Matanzas, province of Matanzas. Population 702.

Chorillo, Sierra del; mountains in southern part of municipal district of Puerto Principe, province of Puerto Principe.

Chorrera Brava; town on Rio Zaza in municipal district of Sancti Spiritus, provvince of Santa Clara.

Chorrera Brava; barrio in municipal district of Sancti Spiritus, province of Santa Clara. Population 83.

Chucho; barrio in municipal district of Mayari, province of Santiago. Population 494.

Ciego; village in municipal district of Macuriges, province of Matanzas.

Ciego; barrio in municipal district of Macuriges, province of Matanzas. Population 595.

Ciego, Punta; point on south coast of province of Pinar del Rio.

Ciego, Punta del; point on south coast of province of Santa Clara.

Ciego Abajo de la Rioja; town in western part of municipal district of Holguin, province of Santiago.

Ciego Alonso; village in municipal district of Camarones, province of Santa Clara.

Ciego Alonzo; barrio in municipal district of San Fernando, province of Santa Clara. Population 1,238.

Ciego de Avila; municipal district in province of Puerto Principe. Area 1,603 square miles. Population 9,801.

Ciego de Avila; an interior city of Puerto Principe. Population 2,919.

Ciego de Avila; barrio in municipal district of Ciego de Avila, province of Puerto Principe. Population 3,892.

Ciego Montero; village in municipal district of Cartagena, province of Santa Clara.

Ciego Montero; barrio in municipal district of Cartagena, province of Santa Clara. Population 433.

Ciegos, Punta de los; point at entrance of Cabañas Bay, north coast of province of Pinar del Rio.

Cienega; barrio in municipal district of Bolondron, province of Matanzas.

Cienega, Arroyo; stream sinking in Cienega Zapata in southern part of province of Santa Clara.

Cienega, Boca de la; inlet on eastern coast of Isla de Pinos.

Cienega de Zapata; barrio in municipal district of Jaguey Grande, province of Matanzas. Population 16.

Cienega, Laguna; small lake in province of Puerto Principe, municipal district of Moron.

Cienfuegos; municipal district in province of Santa Clara. Area 2,119 square miles. Population 59,128.

Cienfuegos; city on south coast of province of Santa Clara. Population 30,038.

Cienfuegos, Bahia de; bay on south coast of municipal district of Cienfuegos, province of Santa Clara.

Cifuentes; municipal district in province of Santa Clara. Area 72 square miles. Population 3,825.

Cifuentes; an interior city of Santa Clara. Population 1,485.

Cifuentes; barrio in municipal district of Cifuentes, province of Santa Clara. Population 2,172.

Cimarones, Arroyo; small stream flowing to south coast of municipal district of Manzanillo, province of Santiago.

Cimarones, Punta; point on south coast of municipal district of Manzanillo, province of Santiago.

Cimarones Grandes, Ensenada and Rio; small river and harbor on south coast of province of Santiago.

Cimarrones, Arroyo; stream flowing to north coast in municipal district of Moron, province of Puerto Principe.

Cinco Leguas, Cayo de; island north of province of Matanzas.

Citerna, Rio de la; left-hand branch of Rio de las Nuevas, Isla de Pinos.

Claudio; village in southern part of province of Matanzas.

Claudio; barrio in municipal district of Macuriges, province of Matanzas. Population 1,390.

Coabillas; town in western part of municipal district of Puerto Principe, province of Puerto Principe.

Coabillas; barrio in municipal district of Roque, province of Matanzas. Population 1,434.

Cobarrubia, Punta; point on coast of municipal district of Puerto Padre, northern part of Santiago Province.

Cobas, Cayos; islands north of province of Santa Clara.

Cobre; municipal district in province of Santiago. Area 870 square miles. Population 10,707.

Cobre; barrio and interior city in municipal district of Cobre, in the province of Santiago, the site of abandoned copper mines. Population 1,028.

Cobre, Rio; river in municipal district of Cobre, province of Santiago.

Cobre, Punta del; point on north coast of Habana Province.

Coca, Arroyo; branch of Rio San Antonio, in Habana Province.

Cochinos, Bahia; bay on southern coast of province of Santa Clara.

Cochinos, Rio; river in central part of province of Matanzas.

Coco, Cayo; large island north of province of Puerto Principe.

Coco, Punta del; point on south coast of province of Pinar del Rio.

Cocodrilos, Caleta; cove on south coast of province of Santa Clara, in municipal district of Cienfuegos.

Cocodrilos, Punta de; point on south coast of Isla de Pinos.

Cocosoto; barrio in municipal district of Marianao, province of Habana. Population 2,602.

Cojimar; barrio in municipal district of Guanabacoa, province of Habana. Population 1,585.

Cojimar, Bahia de; bay on north coast of Habana Province.

Cojimar, Rio; river in Habana province flowing to north coast.

Cojimar, Rio; short river flowing to coast in southern part of municipal district of Cobre, province of Santiago.

Coliseo; village in municipal district of Guamacaro, province of Matanzas.

Coliseo; barrio in municipal district of Guamacaro, province of Matanzas. Population 620.

Colmenar; barrio in municipal district of Consolacion del Sur, province of Pinar del Rio.

Coloma, Ensenada de la; bay on south coast of province of Pinar del Rio.

Coloma, Punta la; point at entrance of Ensenada de la Coloma, on south coast of province of Pinar del Rio.

Coloma, Rio la; river flowing into Ensenada de la Coloma, on south coast of Pinar del Rio.

Colon; municipal district in province of Matanzas. Area 114 square miles. Population 12,195.

Colon; an interior city of Matanzas. Population 7,175.

Colonias; town in southern part of province of Puerto Principe, municipal district of Ciego de Avila.

Colorada, Loma; hill in southern part of province of Santa Clara, municipal district of Trinidad.

Colorada, Loma; hill in municipal district of Gibara, province of Santiago.

Colorado, Arroyo; right-hand branch of Rio Grande in municipal district of Sagua de Tanamo, province of Santiago.

Colorado, Arroyo; small stream flowing to south coast in municipal district of Cobre, province of Santiago.

Colorado, Rio; short left-hand branch of Guayacanes, in municipal district of Moron, province of Puerto Principe.

Columbo, Punta del; point on north coast of Isla de Pinos.

Comadre, Sierra la; mountains in northern part of province of Pinar del Rio.

Comercio; barrio in municipal district of Jaruco, province of Habana.

Compostizo; barrio in municipal district of Aguacate, province of Habana.

Concepcion; barrio in municipal district of Palma Soriano, province of Santiago. Population 1,526.

Concepcion, Arroyo la; right-hand branch of Rio Samaraguacon, in province of Pinar del Rio.

Conchita; barrio in municipal district of Cabañas, province of Pinar del Rio.

Conchita; village near north coast, in municipal district of Cabañas, province of Pinar del Rio.

Concordia; barrio in municipal district of Madruga, province of Habana.

Condado; barrio in municipal district of Santa Clara, province of Santa Clara. Population 1,110.

Congo; town near west coast of province of Santiago, municipal district of Manzanillo.

Congo; barrio in municipal district of Manzanillo, province of Santiago. Population 796.

Congojas; barrio in municipal district of Rodas, province of Santa Clara. Population 2,171.

Consolacion del Norte; municipal district in province of Pinar del Rio. Area 203 square miles. Population 7,399.

Consolacion del Norte; village in municipal district of same name, province of Pinar del Rio.

Consolacion del Sur; municipal district in province of Pinar del Rio. Area 360 square miles. Population 16,665.

Consolacion del Sur; an interior city of Pinar del Rio. Population 3,062.

Consuegra, Arroyo; right-hand branch of Rio Samaraguacon, in province of Puerto Principe.

Contramaestre; village on river of same name, in province of Puerto Principe.

Contramaestre; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 2,368.

Contramaestre, Rio; important left-hand branch of Rio Cauto, in Santiago Province, dividing municipal districts of Cobre and Mayari from Jiguani for a distance of about 35 miles.

Contramaestre, Rio; left-hand branch of Rio Najasa in province of Puerto Principe.

Contreras; village in municipal district of Cardenas, northern part of province of Matanzas.

Contreras; barrio in municipal district of Mendez Capote, province of Matanzas. Population 921.

Conuco; barrio in municipal district of Caibarien, province of Santa Clara. Population 496.

Conuco, Cayo; island off north coast of province of Santa Clara and a barrio in municipal district of Caibarien.

Convento, Punta del; point on south coast of province of Pinar del Rio.

Convento Mulato; hills in municipal district of Manzanillo, province of Santiago.

Coravelo, Punta; point on north coast of province of Matanzas.

Corladeras, Arroyo; left-hand branch of Rio Yaleras, province of Santiago.

Corojal, Punta; point on south coast of province of Pinar del Rio.

Coronel Balcourt, Punta; point on south coast of province of Puerto Principe, municipal district of Santa Cruz del Sur.

Corral Falso; an interior city of Matanzas. Population 3,823.

Corrales, Arroyo; small branch of Arroyo Guayacanes, in municipal district of Moron, province of Puerto Principe.

Corrales, Arroyo; stream in northern part of province of Puerto Principe, uniting with Arroyo Junco to form Arroyo Robles.

Corrales, Loma; hills in western part of province of Puerto Principe, municipal district of Ciego de Avila.

Corralillo; village in southern part of municipal district of Guantanamo, province of Santiago.

Corralillo; village in Habana Province.

Corralillo; town near north coast in municipal district of Ceja de Pablo, province of Santa Clara.

Corralillo; barrio and village in municipal district of Bahai Honda, province of Pinar del Rio.

Corralillo; barrio in municipal district of Bauta, province of Habana.

Corralillo; barrio in municipal district of Ceja de Pablo, province of Santa Clara. Population 2,588.

Corralillo; barrio in municipal district of Guantanamo, province of Santiago. Population 552.

Corralillo, Rio; river in municipal district of Palma Soriano, province of Santiago.

Corralillo, Arroyo; short branch of Rio Caimiabo in southern part of province of Santa Clara.

Corralito; barrio in municipal district of Holguin, province of Santiago. Population 1,026.

Corral Nuevo; barrio in municipal district of Matanzas, province of Matanzas. Population 754.

Corral Nuevo, Laguna; small lake near north coast, in province of Matanzas.

Corras, Punta de las; point on Zapata Peninsula, southern coast of province of Santa Clara.

Corrientes, Cabo; cape on south coast of San Antonio Peninsula, province of Pinar del Rio.

Corrientes, Golfo de; gulf on south coast of San Antonio Peninsula, province of Pinar del Rio.

Cortaderas, Rio; river in province of Santiago, flowing into Bahia de Banes.

Cortes; barrio in municipal district of Guane, province of Pinar del Rio.

Cortes, Cayos; group of small islands off southern coast of province of Pinar del Rio.

Cortes, Laguna de; lagoon on south coast of province of Pinar del Rio.

Cortizo, Cayo; small island about 12 miles north of province of Puerto Principe.

Corua, Punta de la; point on south coast of province of Puerto Principe.

Coruas, Punta las; point on west coast of province of Pinar del Rio.

Coscorro, Lomas de; hills in municipal district of Puerto Principe, province of Puerto Principe.

Coscorrones, Puerto; port on north coast of province of Santa Clara.

Costilla; barrio in municipal district of Jaruco, province of Habana.

Cotilla; barrio in municipal district of San Jose de las Lajas, province of Habana.

Cotilla, Loma de; hill in Habana Province.

Cotorro; village in Habana Province.

Cozojal, Punta de; point on north coast of province of Matanzas.

Crimea; barrio in municipal district of Rancho Veloz, province of Santa Clara. Population 1,240.

Cristal, Arroyo; short branch of Rio Mayabon, in province of Matanzas.

Cristal, Sierra del; mountains in eastern part of municipal district of Mayari, province of Santiago.

Cristales, Arroyo; small stream in Habana Province.

Cristo (formed from Manzanillo); municipal district and city in province of Santiago. Population 1,194.

Cristo; barrio in municipal district of Bayamo, province of Santiago. Population 1,788.

Cristo; barrio in municipal district of Santiago de Cuba, province of Santiago. Population 5,310.

Cristo, Arroyo; left-hand branch of Rio Juan Lopez, province of Santa Clara.

Cristo, Cayo; islet north of province of Santa Clara.

Cristobal, Cayos de; group of small islands south of province of Santa Clara.

Cruces; municipal district in province of Santa Clara. Area 50 square miles. Population 7,953.

Cruces; an interior city of Santa Clara. Population 4,173.

Cruces, Arroyo; small coast stream in municipal district of Manzanillo, Santiago Province.

Cruces, Arroyo las; stream in eastern part of municipal district of Ciego de Avila, province of Puerto Principe.

Cruces, Punta de; point on north coast of Habana Province.

Cruz; barrio in municipal district of Guines, province of Habana.

Cruz, Cabo; cape at southwestern extremity of province of Santiago.

Cruz, Caleta de; cove on south coast of province of Santa Clara, in municipal district of Cienfuegos.

Cruz, Cayo; islet south of province of Puerto Principe.

Cruz, Cayo la; island north of province of Santa Clara.

Cruz, Cayo; island off coast of province of Puerto Principe, and north of Cayo Romano.

Cruz, Cerro del; mountain in northern part of province of Santiago.

Cruz de Bolanos; hills in municipal district of Alto Songo, province of Santiago.

Cuabas; barrio in municipal district of Holguin, province of Santiago. Population 1,223.

Cuajani; barrio in municipal district of Viñales, province of Pinar del Rio. Population 2,021.

Cuartel; barrio in municipal district of Jaruco, province of Habana.

Cuatro Caminos; village in Habana Province.

Cuatro Caminos; village in municipal district of Guantanamo, province of Santiago.

Cuatro Caminos; barrio in municipal district of Guantanamo, province of Santiago. Population 441.

Cubitas, Sierra de; mountains in northern part of municipal district of Puerto Principe, province of Puerto Principe.

Cueva, Cayo de la; islet off north coast of province of Santa Clara.

Cuevas, Punta and Rio; point and small river in south coast of province of Santiago, municipal district of Cobre.

Cuevitas; municipal district in province of Matanzas. Area 79 square miles. Population 5,807.

Cuevitas; an interior city of Matanzas. Population 2,634.

Cuevitas; barrio in municipal district of Cuevitas, province of Matanzas. Population 2,634.

Cuchilla, Alta; barrio in municipal district of Isla de Pinos, province of Habana.

Cuchilla, Arroyo; small stream in northern part of municipal district of Sagua de Tanamo, province of Santiago.

Cuchillas; hills in eastern part of municipal district of Baracoa, province of Santiago.

Cuchilles, Punta; point on west coast of municipal district of Niquero, province of Santiago.

Cuchilles, Rio; river flowing to west coast in municipal district of Niquero, province of Santiago.

Culebra, Rio; branch of Rio Nueva Mayabeque, in Habana Province.

Cumanayagua; village in municipal district of Cienfuegos, province of Santa Clara.

Cumanayagua; village in municipal district of Palmillas, province of Matanzas.

Cumanayagua; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 1,403.

Cumanayagua; barrio in municipal district of Palmillas, province of Matanzas. Population 969.

Cumbre; barrio in municipal district of Matanzas, province of Matanzas.

Cumbre, Loma de la; hill in municipal district of San Diego de los Baños, province of Pinar del Rio.

Cunucunu, Punta; point on north coast of province of Santa Clara.

Cupey, Loma del; hills in northern part of municipal district of Baracoa, province of Santiago.

Cupey, Rio; short stream in northern part of province of Santiago, municipal district of Baracoa.

Cupeyes; village in municipal district of Colon, province of Matanzas.

Cupeyes; barrio in municipal district of Móron, province of Puerto Principe. Population 633.

Curajaya, Arroyo; stream flowing to south coast in municipal district of Puerto Principe, province of Puerto Principe.

Curana; barrio in municipal district of Puerto Padre, province of Santiago. Population 1,000.

Curazao, Punta de; point on south coast of Isla de Pinos.

Curiana, Payo; islet off north coast of municipal district of Puerto Principe, province of Puerto Principe.

Curiana, Punta; point on north coast of province of Puerto Principe.

Cuyaguateje, Rio; river in province of Pinar del Rio. Heads in hills in western part of province and flows south to coast. Length 40 miles.

Cuzco; village in municipal district of San Diego de Nuñez, province of Pinar del Rio.

Cuzco, Cala del; small bay on south coast of province of Santiago.

Cuzco, Loma del; hill in municipal district of Cabañas, northern part of province of Pinar del Rio.

Daguilla, Cerro de; hill in eastern part of Isla de Pinos.

Daiquiri; city on southern coast of Santiago Province. Population 1,380.

Daiquiri; barrio in municipal district of Caney, province of Santiago. Population 1,380.

Dajao; village in southern part of province of Santiago, near city of Santiago.

Dajao; barrio in municipal district of Santiago de Cuba, province of Santiago. Population 1,555.

Damian; village in municipal district of Holguin, province of Santiago.

Damuji, Rio; river in province of Santa Clara, flowing into Cienfuegos Bay. Length 35 miles.

Datil; town in municipal district of Bayamo, province of Santiago.

Datil; barrio in municipal district of Bayamo, province of Santiago. Population 2,142.

Dayamiguas, Ensenada; small bay on south coast of province of Pinar del Rio.

Delgado, Lomas de; hills in Habana Province.

Delicias; barrio in municipal district of Cabañas, province of Pinar del Rio.

Demajayabo; village in municipal district of Santiago de Cuba, province of Santiago.

Demajayabo; barrio in municipal district of Caney, province of Santiago. Population 1,752.

Demajagabo, Ensenada; small bay on south coast of municipal district of Santiago de Cuba, Santiago Province.

Derramados, Arroyo; left-hand branch of Rio Hanabana, in province of Santa Clara.

Deseada, Loma la; hill in eastern part of municipal district of Puerto Principe, province of Puerto Principe.

Diablo, Caleta del; cove on south coast of Isla de Pinos.

Diablo, Punta; point on north coast of province of Santiago.

Diago, Montes de; hills in Habana Province.

Diamante, Caleton del; cove on east coast of province of Santiago.

Diamante, Punta; point at entrance of Cabañas Bay, north coast of province of Pinar del Rio.

Diana, Cayo; small island off north coast of province of Matanzas.

Diego, Cayo; island west of province of Pinar del Rio.

Diego Perez, Cayo de; island south of province of Santa Clara.

Dios, Cayos de; islands near Isla de Pinos.

Dolores; village in municipal district of Artemisa, province of Pinar del Rio.

Dolores; barrio in municipal district of Artemisa, province of Pinar del Rio. Population 1,692.

Dolores; barrio in municipal district of Santiago de Cuba, province of Santiago. Population 9,011.

Dolores, Punta Da.; point on north coast of province of Santiago.

Domingo; barrio in municipal district of Managua, province of Habana.

Domingo Alonso, Lomas; hills in western part of province of Matanzas.

Dominguez; town in southern part of province of Puerto Principe, municipal district of Ciego de Avila.

Dominica, Punta; point on north coast of province of Pinar del Rio.

Doña Maria; barrio in municipal district of Santiago de las Vegas, province of Habana.

Doncella, Arroyo la; short branch of Rio Contramaestra, in municipal district of Jiguani, province of Santiago.

Dorados; barrio in municipal district of Palma Soriano, province of Santiago. Population 691.

Dormitorio, Arroyo; stream in eastern part of municipal district of Ciego de Avila, province of Puerto Principe.

Dos Bocas; village in municipal district of Santiago de Cuba, province of Santiago.

Dos Bocas; barrio in municipal district of Caney, province of Santiago. Population 1,217.

Dos Caminos; barrio in municipal district of San Luis, province of Santiago. Population 3,991.

Dos Cuartonis; barrio in municipal district of Manzanillo, province of Santiago. Population 643.

Dos Palmas; village in municipal district of Cobre, province of Santiago.

Dos Palmas; barrio in municipal district of Cobre, province of Santiago. Population 1,226.

Doucella, Loma de la; hills in municipal district of Guantanamo, province of Santiago.

Duaba; village in municipal district of Baracoa, near city of Baracoa, province of Santiago.

Duaba; barrio in municipal district of Baracoa, province of Santiago. Population 1,186.

Duaba, Rio; river in municipal district of Baracoa, province of Santiago, flowing to north coast. Length 18 miles.

Duran, Rio; river flowing to coast in southwestern part of municipal district of Puerto Principe, province of Puerto Principe. Length 35 miles.

Ebano, Punta del; point on north coast of Cayo Sabinal, province of Puerto Principe.

Ecuador; town in southern part of municipal district of Puerto Principe, province of Puerto Principe.

Ecuador; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 2,215.

Egidos; barrio in municipal district of Camajuani, province of Santa Clara. Population 700.

Egidos; barrio in municipal district of San Antonio de las Vueltas, province of Santa Clara. Population 634.

Egidos; barrio in municipal district of Santa Clara, province of Santa Clara. Population 1,987.

El Calvario; village in Habana Province.

El Cerro; village in Habana Province, suburb of Habana.

El Gabriel; village in Habana Province.

El Gato, Rio; branch of Rio Culebra, in Habana Province.

El Gauey; village in municipal district of Santiago de Cuba, province of Santiago.

El Horno; village in municipal district of Bayamo, Santiago Province.

El Jibaro, Arroyo; small branch of Rio Almendares in Habana Province.

El Jobo; village in municipal district of Guanajay, province of Pinar del Rio.

El Masio, Laguna; small lake in municipal district of Macuriges, province of Matanzas.

El Rayo; village in municipal district of Guanajay, northern part of province of Pinar del Rio.

El Santo; village near coast in municipal district of Calabazar, province of Santa Clara.

El Varadero; village on north coast of province of Matanzas.

Encrucijada; city in Santa Clara. Population 1,725.

Encrucijada; village in municipal district of Calabazar, northern part of province of Santa Clara.

Encrucijada; barrio in municipal district of Calabazar, province of Santa Clara. Population 2,689.

Entresaco, Peninsula de; peninsula on north coast of Santiago between Bahia de Nipe and Bahia de Lebisa.

Ermitano; barrio in municipal district of Cobre, province of Santiago. Population 240.

Escalera; barrio in municipal district of Jaruco, province of Habana.

Escalera, Montes de la; hills in Habana Province.

Escalereta, Punta; point on south coast of municipal district of Niquero, Santiago Province.

Escarza; barrio in municipal district of San Fernando, province of Santa Clara.

Escondido; village in eastern part of municipal district of Baracoa, province of Santiago.

Escondido, Puerto; port on south coast of province of Santiago.

Escondido, Punta; point on north coast of province of Matanzas.

Esparto, Loma del; hills in eastern part of province of Santiago.

Esperanza; municipal district in province of Santa Clara. Area 159 square miles. Population 7,811.

Esperanza; an interior city of Santa Clara. Population 2,177.

Esperanza; barrio in municipal district of Manzanillo, province of Santiago. Population 1,726.

Esquina de Teja; village in municipal district of Cardenas, northern part of province of Matanzas.

Estabones, Cayos los; small islands west of province of Pinar del Rio.

Estaca, Punta de la; point on northeastern coast of province of Santiago.

Estante; village in municipal district of Alacranes, western part of province of Matanzas.

Estante; barrio in municipal district of Alacranes, province of Matanzas. Population 2,823.

Este; barrio in municipal district of Alacranes, province of Matanzas. Population 716.

Este, Punta del; point on east coast of Isla de Pinos.

Esteron; barrio in municipal district of Sagua de Tanamo, province of Santiago. Population 545.

Estrella, Alto de la; hills in municipal district of Mayari, province of Santiago.

Estropajos, Arroyo; small branch of Rio Samaraguacon, in province of Puerto Principe.

Fabrica, Cayos de la; groups of small islands south of province of Santa Clara.

Fajonal, Punta; point on north coast of Habana Province.

Falcones, Cayos de los; group of islands north of province of Santa Clara.

Falso, Cabo; cape on south coast of San Antonio peninsula, province of Pinar del Rio.

Farallon, Caleta; cove on south coast of province of Santa Clara, in municipal district of Cienfuegos.

Farallones, Lomas de; hills in southern part of province of Santiago.

Farfan, Arroyo; small branch of Arroyo Guayacanes, in municipal district of Moron, province of Puerto Principe.

Feo, Rio; small right-hand branch of Rio Sequia, western part of province of Pinar del Rio.

File, Arroyo; small left-hand branch of Rio Contramaestra, in municipal district of Jiguani, province of Santiago.

Fisga, Punta de; point on south coast of province of Pinar del Rio.

Flacos, Laguna; small lake on San Antonio peninsula, western part of province of Pinar del Rio.

Flamenco, Cayo; islet south of province of Santa Clara.

Flamencos, Arroyo; small stream flowing to south coast, in province of Pinar del Rio.

Flamencos, Punta; point on south coast of Habana Province.

Flores, Loma las; hill in municipal district of Pinar del Rio, province of Pinar del Rio.

Florida Blanca; barrio in municipal district of Alto Songo, province of Santiago. Population 1,081.

Fomento; village in municipal district of Trinidad, province of Santa Clara.

Fomento; barrio in municipal district of Trinidad, province of Santa Clara. Population 1,769.

Fragatas, Punta; point on north coast of province of Pinar del Rio.

Fragoso, Cayo; large island north of province of Santa Clara.

Fraile, Punta del; point on north coast of province of Santiago.

Fraile, Punta del; point on south coast of San Antonio peninsula, province of Pinar del Rio.

Frailecito, Punta del; point on north coast of province of Santiago.

Frances, Cabo; cape on south coast of province of Pinar del Rio.

Frances, Cabo; cape on west coast of Isla de Pinos.

Frances, Punta; point on Peninsula de Hicacos, north coast of province of Matanzas.

Francisco; village in municipal district of Guane, province of Pinar del Rio.

Fray Benito; village in municipal district of Gibara, province of Santiago.

Fray Benito; barrio in municipal district of Gibara, province of Santiago. Population 2,663.

Frias; barrio in municipal district of Candelaria, province of Pinar del Rio.

Frijol, Sierra del; mountains in municipal district of Baracoa, province of Santiago.

Frio, Rio; right-hand branch of Rio Cuyaguateje, in western part of province of Pinar del Rio.

Fuera, Punta de; point on north coast of Isla de Pinos.

Fuga, Cayo; islet south of province of Santa Clara.

Funche, Arroyo del; stream flowing to north coast in San Antonio peninsula, province of Pinar del Rio.

Fundicion; barrio in municipal district of Cardenas, province of Matanzas.

Gabriel; village in municipal district of San Diego de Nuñez, province of Pinar del Rio.

Gabriel; barrio in municipal district of Guira de Melena, province of Habana. Population 764.

Gabriel; barrio in municipal district of San Nicolas, province of Habana.

Galafre; barrio in municipal district of San Juan y Martinez, province of Pinar del Rio.

Galeon; barrio in municipal district of Bolondron, province of Matanzas.

Galeoncita; barrio in municipal district of Alacranes, province of Matanzas. Population 474.

Galindo, Cayos; islands north of province of Matanzas.

Gallardo; barrio in municipal district of Jaguey Grande, province of Matanzas. Population 750.

Gallego, Alto de la; hill in Habana Province.

Galofre, Rio; short river flowing to south coast in western part of Pinar del Rio.

Gamado, Punta del; point on coast of municipal district of Nuevitas, province of Puerto Principe.

Gamboa, Arroyo; short stream flowing to north coast in municipal district of Sagua de Tanamo, Santiago Province.

Gansi, Punta; point on north coast of province of Santa Clara.

Ganuza; barrio in municipal district of San Jose de las Lajas, province of Habana.

Garcia, Arroyo; small branch of Rio Jabacoa, in southern part of province of Santa Clara.

Garnacha, Ensenada; bay on west coast of province of Pinar del Rio.

Garrido; village in municipal district of Cabañas, province of Pinar del Rio.

Garrido, Pico; peak in municipal district of Pinar del Rio, province of Pinar del Rio.

Garzo; barrio in municipal district of Jaruco, province of Habana.

Gato, Montes del; hills in Habana province.

Gato, Punta de; point on south coast of province of Pinar del Rio.

Gato, Punta del; point on south coast of municipal district of Manzanillo, province of Santiago.

Gavilan; barrio in municipal district of Cienfuegos, province of Santa Clara.

Gavilan, Punta; point on south coast of province of Santa Clara.

Gavilan, Rio; river flowing to south coast in municipal district of Cienfuegos, province of Santa Clara.

Gavilana, Lomas de la; hills in Habana Province.

Gavilancito; barrio in municipal district of Cienfuegos, province of Santa Clara.

Gazuela, Arroyo; stream flowing to south coast in province of Puerto Principe.

Geladas, Sierra de las; mountains in municipal district of Pinar del Rio.

Geronimo, Punta; point on west coast of province of Pinar del Rio.

Gibara; municipal district in province of Santiago. Area 466 square miles. Population 31,594.

Gibara; city on north coast of Santiago. Population 6,841.

Gibara, la Silla de; hills in northern part of municipal district of Gibara, province of Santiago.

Giquima, Alto de la; hill in Habana Province.

Gitano, Cayo; islet southwest of province of Puerto Principe.

Gloria, Loma de la; hill in Habana Province.

Gloria, Loma la; hill in municipal district of Trinidad, southern part of province of Santa Clara.

Glorietta; barrio in municipal district of Guantanamo, province of Santiago. Population 2,052.

Gobernadora, Punta; point on north coast of province of Pinar del Rio.

Gobierno; barrio in municipal district of Guantanamo, province of Santiago. Population 1,219.

onzalo; barrio in municipal district of Bolondron, province of Matanzas.

orda, Punta; point on north coast of province of Santiago, municipal district of Gibara.

orda, Punta; point on north coast of province of Puerto Principe.

orda, Punta; point on Zapata Peninsula, south coast of province of Santa Clara.

orda, Punta; point on north coast of province of Pinar del Rio.

orda, Punta; point on north coast of municipal district of Baracoa, province of Santiago.

orda, Punta; point on south coast of province of Santa Clara.

orda, Punta; point on north coast of province of Santa Clara, in municipal district of Quemado de Guines.

orda, Punta; point on north coast of province of Santa Clara, municipal district of Las Vueltas.

ordas, Arroyo de las; small stream flowing to west coast, in province of Pinar del Rio.

ordas, Arroyo las; left-hand branch of Rio Tana, in province of Puerto Principe.

ordas, Cayo Julias; island north of province of Santa Clara.

ovea; barrio in municipal district of San Antonio de los Baños, province of Habana. Population 671.

ral Concha, Cayo; island north of province of Santa Clara.

ral Laborde, Cayo; island north of province of Santa Clara.

ral Rubalcava, Punta; point on north coast of province of Matanzas.

ral Vives, Cayo; island north of province of Matanzas.

ramal, Rio; river in province of Puerto Principe, flowing to north coast. Length 30 miles.

ramales, Sierra de; mountains in western part of province of Pinar del Rio.

ranadillas; village near north coast, in municipal district of San Diego de Nuñez, province of Pinar del Rio.

rande, Arroyo; left-hand branch of Rio Zaza, province of Santa Clara, municipal district of Sancti Spiritus.

rande, Arroyo; small stream, sinking in marsh, in southern part of Isla de Pinos.

rande, Caleta; small bay on west coast of Isla de Pinos.

rande, Laguna; lake in municipal district of Santa Cruz del Sur, southern part of province of Puerto Principe.

rande, Laguna; small lake near north coast of municipal district of Puerto Principe, province of Puerto Principe.

rande, Punta; point on north coast of Santiago province, municipal district of Gibara.

rande, Rio; river in northwestern part of municipal district of Sagua de Tanamo, province of Santiago, flowing to coast.

rande, Rio; river in province of Puerto Principe. Heads in Loma Arroyo Blanco and flows south to coast. Length 30 miles.

ran Diabola, Punta; point on south coast of province of Santa Clara.

rantierra; barrio in municipal district of Baracoa, province of Santiago. Population 632.

rifa; village near south coast, in municipal district of Guane, province of Pinar del Rio.

rifa, Ensenada de la; small bay on south coast of province of Pinar del Rio.

rillo; barrio in municipal district of Santa Maria del Rosario, province of Habana.

rillo, Loma del; hill in Habana Province.

rulla, Punta de la; point on south coast of province of Puerto Principe, municipal district of Moron.

uacamayas, Rio; river flowing to north coast, in western part of province of Pinar del Rio.

Guacamayas, Sierra; mountains in municipal district of Consolacion del Norte, province of Pinar del Rio.

Guadalupe; town in the hilly region of municipal district of Moron, western part of province of Puerto Principe.

Guadalupe; village in municipal district of Camajuani, province of Santa Clara.

Guadalupe; barrio in municipal district of Camajuani, province of Santa Clara. Population 2,569.

Guadalupe; barrio in municipal district of Moron, province of Puerto Principe. Population 1,554.

Guadina, Ensenada and Puerto; bay and harbor on west coast of province of Pinar del Rio.

Guadina, Punta de; point at entrance of Guadina Harbor, west coast of province of Pinar del Rio.

Guagenes, Rio; head stream of Rio Mayabeque, in Habana Province.

Guagui, Rio; small left-hand branch of Yumuri River, in Santiago Province.

Guaicanamar; barrio in municipal district of Jaruco, province of Habana.

Guaicanamar; barrio in municipal district of Santa Cruz del Sur, province of Puerto Principe. Population 598.

Guaicanamar, Arroyo; left-hand branch of Rio Najasa, in province of Puerto Principe.

Guaicanamar, Canada; stream flowing to south coast in province of Puerto Principe.

Guaicanamar, Sierra de; mountains in southern part of municipal district of Puerto Principe, province of Puerto Principe.

Guaimaro; town in eastern part of municipal district of Puerto Principe, province of Puerto Principe.

Guaimaro; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 2,940.

Guaiquiba; village in southern part of province of Pinar del Rio, municipal district of San Cristobal.

Guajaba, Isla de; island north of municipal district of Puerto Principe, province of Puerto Principe.

Guajabana; village near north coast of province of Santa Clara, in municipal district of Caibarien.

Guajabana; barrio in municipal district of Caibarien, province of Santa Clara. Population 478.

Guajaco, Arroyo; small stream in municipal district of Puerto Padre, Santiago Province.

Guajay; village in Habana Province.

Guajaybon; barrio in municipal district of Mariel, province of Pinar del Rio.

Guajaybon, Pan de; highest summit of Organ Mountains in Pinar del Rio. Height 2,500 feet.

Guajimico, Arroyo; creek flowing to south coast in municipal district of Cienfuegos, province of Santa Clara.

Guajiro; barrio and village in municipal district of Julian Diaz, province of Pinar del Rio.

Guama, Rio; river flowing to coast in municipal district of Santiago de Cuba, province of Santiago.

Guama, Rio; right-hand branch of Rio Bayamo, in municipal district of Bayamo, province of Santiago.

Guamacaro; municipal district in province of Matanzas. Area 159 square miles. Population 6,000.

Guamacaro; village in municipal district of Guamacaro, province of Matanzas.

Guamacaro; barrio in municipal district of Guamacaro, province of Matanzas. Population 552.

Guamajales; barrio in municipal district of Roque, province of Matanzas. Population 499.

Guamatas; village in municipal district of Marti, province of Matanzas.

Guamo; town on Rio Cauto, in municipal district of Bayamo, province of Santiago.

Guamo; barrio in municipal district of Bayamo, province of Santiago. Population 769.

Guamutas; barrio in municipal district of Marti, province of Matanzas. Population 2,505.

Guanabacoa; municipal district in province of Habana. Area 85 square miles. Population 20,080.

Guanabacoa; city near Habana, on north coast of Habana Province. Population 13,965.

Guanabana; village in municipal district of Matanzas, province of Matanzas.

Guanabana; barrio in municipal district of Matanzas, province of Matanzas. Population 1,005.

Guanabana, Arroyo; stream in western part of municipal district of Puerto Padre, Santiago Province.

Guanabito, Lomas del; hills in Habana Province.

Guanabo; village in Habana Province.

Guanabo; barrio in municipal district of Batabano, province of Habana. Population 436.

Guanabo; barrio in municipal district of Jaruco, province of Habana. Population 908.

Guanabo, Arroyo; short left-hand branch of Rio Jatibonico, in municipal district of Moron, province of Puerto Principe.

Guanabo, Cayo de; small island off north coast of province of Santa Clara.

Guanabo, Punta de; point on north coast of Habana Province.

Guanabo, Rio; river in Habana Province, flowing to north coast.

Guanagayabo, Laguna; lake near north coast in province of Matanzas.

Guanaja; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 848.

Guanajales; village in municipal district of Roque, province of Matanzas.

Guanajara, Rio; river flowing to south coast in province of Santa Clara, municipal district of Trinidad. Length 30 miles.

Guanajay; municipal district in province of Pinar del Rio. Area 12 square miles. Population 8,796.

Guanajay; an interior city of Pinar del Rio. Population 6,483.

Guanajo; barrio in municipal district of Guines, province of Habana.

Guanal, Punta del; point on north coast of San Antonio Peninsula, province of Pinar del Rio.

Guanal, Punta; point on east coast of province of Santiago.

Guanal, Punta de; point on north coast of province of Santiago.

Guanales; barrio in municipal district of Ciego de Avila, province of Puerto Principe. Population 508.

Guanayara, Rio; river flowing to south coast in municipal district of Trinidad, province of Santa Clara.

Guanayu, Arroyo; right-hand branch of Rio Tana, province of Santiago.

Guandao; barrio in municipal district of Baracoa, province of Santiago. Population 1,536.

Guandas; village in eastern part of municipal district of Baracoa, province of Santiago.

Guane; municipal district in province of Pinar del Rio. Area 1,155 square miles. Population 14,760.

Guane; village in municipal district of Guane, province of Pinar del Rio.

Guane; barrio in municipal district of Guane, province of Pinar del Rio. Population 1,038.

Guane, Cerro de; hill in municipal district of same name in province of Pinar del Rio.

Guanes, Punta; point on north coast of province of Pinar del Rio.

Guanes, Punta de; point on north coast of province of Matanzas.

Guanes, Puerto de; cove on north coast of Habana Province.

Guaney, Punta; point on north coast of province of Pinar del Rio.

Guanijibe; village in municipal district of San Juan de los Remedios in northern part of province of Santa Clara.

Guanijibes; barrio in municipal district of San Juan de los Remedios, province of Santa Clara. Population 1,047.

Guanillas; barrio in municipal district of Rancho Veloz, province of Santa Clara. Population 936.

Guanimar, barrio in municipal district of Alquizar, province of Habana. Population 485.

Guaninicun, Rio; left-hand branch of Rio Majagebo, province of Santiago.

Guaninicun; village in southern part of municipal district of Alto Songo, province of Santiago.

Guaninicun; barrio in municipal district of Caney, province of Santiago. Population 1,247.

Guaniquical; barrio in municipal district of Trinidad, province of Santa Clara. Population 985.

Guaniquical, Lomas; hills in municipal district of Trinidad, southern part of province of Santa Clara.

Guanito, Punta del; point on south coast of province of Pinar del Rio.

Guano, Laguna; small lake in northern part of municipal district of Ciego de Avila, province of Puerto Principe.

Guanos, Punta de; point on southeast coast of province of Santiago.

Guantanamo; municipal district in province of Santiago. Area 1,216 square miles. Population 28,063.

Guantanamo; a coast city of Santiago. Population 7,137.

Guantanamo, Rio; river in southern part of province of Santiago. Heads in Santa Maria Mountains in municipal district of Alto Songo, and flows southeastward into Guantanamo Bay. Length 42 miles.

Guara; municipal district in province of Habana. Area 29 square miles. Population 1,835.

Guara; village in Habana Province.

Guara, Rio; branch of Rio San Antonio in Habana Province.

Guara, Rio la; small stream in western part of province of Matanzas.

Guaracabulla; village in municipal district of Placetas, province of Santa Clara.

Guaracabulla; barrio in municipal district of Placetas, province of Santa Clara. Population 1,194.

Guaracabun, Rio; right-hand branch of Rio Manati, province of Santa Clara.

Guarana, Arroyo del Brazo; right-hand branch of Rio Sevilla in province of Puerto Principe.

Guarda Boca, Punta; point on north coast of province of Santiago, municipal district of Gibara.

Guareiras; village in municipal district of Palmillas, province of Matanzas.

Guareiras; barrio in municipal district of Palmillas, province of Matanzas. Population 793.

Guareiras, Rio; left-hand branch of Rio Negro, in southern part of province of Matanzas.

Guarito, Punta de; point on north coast of municipal district of Baracoa, province of Santiago.

Guaro, Rio; river rising in northern part of municipal district of Guantanamo, province of Santiago, and flowing south into Guantanamo Bay. Length 17 miles.

Guaro, Rio; right-hand branch of Nipe River, in northern part of municipal district of Mayari, province of Santiago.

Guasasas, Caleta; small bay on south coast of province of Santa Clara in municipal district of Cienfuegos.

Guasas, Brazo de; left-hand branch of Rio Negro in southern part of province of Matanzas.

Guasimal; village on river of same name in southern part of province of Santa Clara.

Guasimal; barrio in municipal district of Sancti Spiritus, province of Santa Clara. Population 1,500.

Guasimal, Arroyo de; small branch of Arroyo Yagua in province of Santa Clara.

Guasimas; barrio and village in municipal district of Cardenas, province of Matanzas.

Guasimas, Laguna de las; lake in southeastern part of province of Puerto Principe, near coast.

Guasimas, Loma las; hill in municipal district of San Juan y Martinez, province of Pinar del Rio.

Guaso; village in municipal district of Guantanamo, province of Santiago.

Guaso; barrio in municipal district of Guantanamo, province of Santiago. Population 1,514.

Guata; village in municipal district of Sagua la Grande, province of Santa Clara.

Guatao; barrio and village in municipal district of Bauta, province of Habana.

Guayabal; municipal district in province of Pinar del Rio. Area 37 square miles. Population 2,710.

Guayabal; town on south coast of province of Puerto Principe.

Guayabal; barrio in municipal district of Guayabal, province of Pinar del Rio.

Guayabal; barrio in municipal district of Santa Cruz del Sur, province of Puerto Principe. Population 937.

Guayabal, Punta; point on north coast of province of Pinar del Rio.

Guayabal, Punta del; point on south coast of municipal district of Santa Cruz del Sur, province of Puerto Principe.

Guayabal, Rio; right-hand branch of Rio Toa in Santiago Province.

Guayabano, Rio de; right-hand branch of Rio Sabana la Mar, in municipal district of Guantanamo, province of Santiago. Length 15 miles.

Guayabo; village in municipal district of Pinar del Rio, province of Pinar del Rio.

Guayabo; barrio in municipal district of Mantua, province of Pinar del Rio.

Guayabo; barrio in municipal district of Mayari, province of Santiago. Population 1,393.

Guayabo; barrio in municipal district of Pinar del Rio, province of Pinar del Rio. Population 1,894.

Guayabo, Arroyo; stream flowing to south coast in province of Puerto Principe.

Guayabo, Rio; river flowing to eastern coast on Isla de Pinos.

Guayabo Largo; village in municipal district of Roque, southern part of province of Matanzas.

Guayabon; village in municipal district of Guanajay, northern part of province of Pinar del Rio.

Guayabon, Punta; point on north coast of province of Pinar del Rio.

Guayacabo, Rio; river near west coast in municipal district of Bayamo, Santiago Province.

uayacanes, Arroyo; stream flowing to south coast in municipal district of Ciego de Avila, province of Puerto Principe. Known as Arroyo los Negros near its mouth. Length 30 miles.

uayacanes, Punta; point on south coast of province of Santiago.

uayacanes, Punta; point on north coast of Habana Province.

uayo; village in municipal district of San Juan de las Yeras, province of Santa Clara.

uayo; barrio in municipal district of San Juan de las Yeras, province of Santa Clara. Population 927.

uayos; village in municipal district of Sancti Spiritus, province of Santa Clara.

uayos; barrio in municipal district of Sancti Spiritus, province of Santa Clara. Population 1,430.

uces, Rio; left-hand branch of Rio Juan Lopez, western part of province of Santa Clara.

uiabasan, Rio; left-hand branch of Rio Tajacon, in Santiago Province.

uillen; barrio in municipal district of San Juan y Martinez, province of Pinar del Rio.

uinia de Miranda; village in municipal district of Trinidad, province of Santa Clara.

uinia de Miranda; barrio in municipal district of Trinidad, province of Santa Clara. Population 1,056.

uincho, Punta del; point on north coast of province of Puerto Principe.

uines; municipal district in province of Habana. Area 38 square miles. Population 11,394.

uines; an interior city of Habana Province. Population 8,149.

uines; village in municipal district of Quemado de Guines, province of Santa Clara.

uines; barrio in municipal district of Quemado de Guines, province of Santa Clara. Population 1,174.

uiniao; village in northeastern part of municipal district of Baracoa, province of Santiago.

Guiniao; barrio in municipal district of Baracoa, province of Santiago. Population 1,686.

Guira; city in province of Matanzas. Population 1,676.

Guira; village in municipal district of Holguin, Santiago Province.

Guira, Loma de la; hills in municipal district of Cobre, province of Santiago.

Guira, Rio la; short left-hand branch of Rio Contramaestra, Santiago Province.

Guira, Sierra de; mountains in municipal district of San Diego de los Baños, province of Pinar del Rio.

Guira de Melena; municipal district in province of Habana. Area 63 square miles. Population 11,548.

Guiros, Rio los; river flowing to south coast in province of Puerto Principe. Length 25 miles.

Guisa; village in municipal district of Bayamo, province of Santiago.

Guisa; barrio in municipal district of Bayamo, province of Santiago. Population 3,565.

Guizasos, Punta de; point on south coast of Zapata Peninsula, south coast of province of Santa Clara.

Guma, Ensenada del; small bay on south coast of municipal district of Niquero, province of Santiago.

Gurajaya, Cayos de; islets off south coast of municipal district of Santa Cruz del Sur, province of Puerto Principe.

Habana; the smallest and most densely populated of the provinces of Cuba. It lies in the western part of the island, extending across from north to south, and includes Isla de Pinos, lying south of Cuba, which is connected with this province as a municipal district. The area, including Isla de Pinos (840 square miles), is 2,772 square miles. The surface is rolling, without decided relief.

The population in 1899 was 424,804, showing an average density of population of 153 per square mile. Owing to the presence of the city of Habana, as well as other large towns, the urban population comprised not less than 65 per cent of the total number of inhabitants. Males were in excess of females to the extent of 5 per cent. The native whites constituted 58 per cent of the total population, colored 26 per cent, and foreign whites 16 per cent, the greater part of the foreign born being found in the city of Habana. This is the only province the majority of whose inhabitants are able to read, the proportion of literates being 53 per cent. The province is divided into 36 municipal districts and contains a number of large cities, among them Habana, Guanabacoa, Guines, Marianao, Melena, Regla, and San Antonio de los Baños.

Habana; the capital and chief city of Cuba. It is situated upon the western shore of Habana harbor, one of those curious pouch-shaped harbors so common upon the Cuban coast. The population in 1899 was 235,981, making it by far the largest city of the island. Of the population males are in excess to the extent of 5 per cent. As to race and nativity, 49 per cent, or a trifle less than one-half, are native whites. The proportion of foreign born was no less than 22 per cent, while that of colored was 28 per cent. The foreign born were composed in a large proportion of persons of Spanish blood. The water supply of Habana is derived from the springs of Vento, 9 miles distant, the water being brought to the city by aqueduct.

Habana; municipal district in province of Habana. Area 57 square miles. Population 242,055.

Hacha, Rio del; left-hand branch of Rio Zaza, in municipal district of Placetas, province of Santa Clara.

Hachuela, Cayo; island north of province of Santa Clara.

Hanabana, Rio; river rising in northwestern part of province of Santa Clara and flowing between provinces of Santa Clara and Matanzas, into Laguna del Tesoro. Length 38 miles.

Hanabanilla, Rio; left-hand branch of Rio Arimao, in southern part of province of Santa Clara.

Hatibonico, Surgidero; anchorage on south coast of municipal district of Guantanamo, province of Santiago.

Hatiguanico, Rio; outlet of Laguna del Tesoro, dividing provinces of Matanzas and Santa Clara for a distance of 45 miles, and flowing into Ensenada de la Broa on south coast.

Hatillo; village in municipal district of San Diego del Valle, province of Santa Clara.

Hatillo; barrio in municipal district of San Diego del Valle, province of Santa Clara. Population 461.

Hato Nuevo; village in municipal district of Marti, province of Matanzas.

Hato Nuevo de Santa Clara; hills in northern part of province of Matanzas.

Hato Quemado; barrio in municipal district of Consolacion del Sur, province of Pinar del Rio.

Hayagan, Arroyo; small left-hand branch of Rio Sagua la Chica, in municipal district of Santa Clara, province of Santa Clara.

Helcobal, Lomas; hills in southern part of province of Santa Clara.

Helechal, Loma; hill in municipal district of Guantanamo, province of Santiago.

Hembra, Punta de la; point on eastern coast of province of Santiago.

Hermitano; village in municipal district of Cobre, province of Santiago.

Hernando; barrio in municipal district of Placetas, province of Santa Clara.

Herradura; village in municipal district of San Diego de los Baños, province of Pinar del Rio.

Herradura; barrio in municipal district of Julian Diaz, province of Pinar del Rio.

Herradura, Ensenada; cove on north coast of municipal district of Holguin, Santiago province.

Herradura, Laguna la; lake in municipal district of Guane, southern part of province of Pinar del Rio.

Herradura, Punta; point on north coast of Santiago Province, municipal district of Holguin.

Herradura, Rio; river flowing to south coast in province of Pinar del Rio. Length 26 miles.

Herreso, Loma del; hills in Habana Province.

Hicacos, Arroyo de; small right-hand branch of Rio de Baja, in western part of province of Pinar del Rio.

Hicacos, Cabo; cape at extremity of peninsula of same name, northern part of province of Matanzas.

Hicacos, Peninsula de; on the north coast of province of Matanzas.

Hicacos, Punta; point on north coast of Santiago Province, municipal district of Gibara.

Hicacos, Punta; point on north coast of Habana Province.

Hierro, Lomas; hills in municipal district of Puerto Principe, province of Puerto Principe.

Hierro, Punta de; point on south coast of province of Santiago, municipal district of Manzanillo.

Higuanojo, Rio; river in province of Santa Clara. Heads in Lomas de Banao and flows south to coast. Length 18 miles.

Holandes, Punta del; point on south coast of San Antonio peninsula, province of Pinar del Rio.

Holguin; municipal district in province of Santiago. Area 1,589 square miles. Population 34,506.

Holguin; an interior city of Santiago. Population 6,045.

Holguin, Rio; right-hand branch of Rio Salado, in municipal district of Holguin, province of Santiago. Length 22 miles.

Hondito, Punta del; point on north coast of province of Santiago.

Hondo, Arroyo; small stream near west coast of municipal district of Manzanillo, Santiago Province.

Hondo, Rio; river in province of Pinar del Rio. Heads in hills of municipal district of San Diego de Nuñez and flows southeastward to coast. Length 24 miles.

Hondo, Rio; river in Pinar del Rio. Heads in Sierra de los Organos and flows southeastward to coast. Length 38 miles.

Hondo, Rio; tributary to Quivican River in Habana Province.

Hondo, Rio; right-hand branch of Rio Higuanojo, in southern part of province of Santa Clara.

Hondon, Punta del; point on west coast of province of Santiago, municipal district of Manzanillo.

Hongolosongo; village in municipal district of Cobre, province of Santiago.

Hongolosongo; barrio in municipal district of Cobre, province of Santiago. Population 1,987.

Horcones; village in municipal district of Consolacion del Sur, province of Pinar del Rio.

Horcones; barrio in municipal district of Consolacion del Sur, province of Pinar del Rio. Population 1,608.

Hormigas, Cayo; islet south of province of Puerto Principe.

Hormiguero, Arroyo; left branch of Cayajo River in western part of Santiago Province.

Horno; barrio in municipal district of Bayamo, province of Santiago. Population 1,908

Hospital; barrio in municipal district of Guantanamo, province of Santiago. Population 1,594.

Hoyo Colorado; village in Habana province.

Hoyo Colorado; barrio in municipal district of Bauta, province of Habana. Population 1,046.

Hoyos; barrio in municipal district of Baracoa, province of Santiago. Population 729.

Iglesia; an interior city of Matanzas. Population 3,441.

Iguara; barrio in municipal district of Ciego de Avila, province of Puerto Principe. Population 419.

Iguana, Punta; point on south coast of province of Puerto Principe.

Iguanabana, Rio; right-hand branch of Rio Guantanamo, in municipal district of Guantanamo, Santiago province. Length 15 miles.

Imias; barrio in municipal district of Baracoa, province of Santiago. Population 547.

Imias, Arroyo; small branch of Arroyo la Concepcion, in province of Puerto Principe.

Imias, Punta; point on south coast of province of Santiago.

Imias, Rio; river in southern part of municipal district of Baracoa, Santiago province.

Indico, Rio; right-hand branch of Baconao River, in Santiago Province.

Indio, Punta Del; point on north coast of Habana Province.

Indios; barrio in municipal district of Guantanamo, province of Santiago. Population 107.

Indios, Cayos de La; group of small islands west of Isla de Pinos.

Indios, Laguna Los; lake in municipal district of Guane, southern part of province of Pinar del Rio.

Indios, Loma de Los; hills on north coast of municipal district of Gibara, province of Santiago.

Indios, Rio de Los; stream flowing to west coast in Isla de Pinos.

Industria, Rio de La; river in Habana province flowing to south coast.

Ines de Sota, Cayo; island north of province of Pinar del Rio.

Infierno, Caleta del; cove on south coast of Isla de Pinos.

Infierno, Sierra del; mountains in municipal district of Pinar del Rio, province of Pinar del Rio.

Ingles, Caleta; cove on west coast of Isla de Pinos.

Ingles, Caleta de; cove on south coast of province of Santa Clara.

Ingles, Punta del; point on south coast of municipal district of Niquero, province of Santiago.

Ingleses, Punta las; point on west coast of province of Pinar del Rio.

Iridio, Arroyo; branch of Rio Turquina, near coast, in municipal district of Cobre, Santiago province.

Isabel; village in southern part of province of Matanzas.

Isabela, Punta; point on north coast of province of Santiago.

Isabela de Sagua; barrio in municipal district of Sagua la Grande, province of Santa Clara. Population 2,352.

Isabel Maria; village in municipal district of Pinar del Rio, province of Pinar del Rio.

Isabel Maria; barrio in municipal district of Pinar del Rio, province of Pinar del Rio. Population 1,136.

Isla de Pinos; island forming a municipal district in province of Habana. Area 840 square miles. Population 3,199.

Isleta; barrio in municipal district of Guantanamo, province of Santiago. Population 80.

Itabo; village in municipal district of Marti, province of Matanzas.

tabo; barrio in municipal district of Marti, province of Matanzas. Population 252.

tabo, Arroyo; creek on west coast of Isla de Pinos.

tabo, Loma; hill in Habana Province.

ava, Punta de la; point on south coast of province of Santiago.

ababo, Rio; river heading in Loma Alta de Rompe and flowing south, between provinces of Santiago and Puerto Principe, into small harbor of same name. Length 37 miles.

abaco; village in municipal district of Cuevitas, province of Matanzas.

abaco; barrio in municipal district of Cuevitas, province of Matanzas. Population 997.

abacoa; village in municipal district of Rodas, province of Santa Clara.

abacoa; barrio in municipal district of Rodas, province of Santa Clara. Population 139.

abacoa, Rio; right-hand branch of Rio Damuji in southern part of Santa Clara.

abonillar; barrio in municipal district of Esperanza, province of Santa Clara. Population 720.

acan; barrio in municipal district of Palmillas, province of Matanzas. Population 1,642.

acinto, Arroyo; stream flowing to north coast in municipal district of Nuevitas, province of Puerto Principe.

acomino; village in Habana Province.

agua; village in Habana Province.

agua; village on south coast of province of Santa Clara.

agua, Loma la; hill in municipal district of Consolacion del Norte, province of Pinar del Rio.

agua, Rio de la; river heading in interior of Isla de Pinos and sinking in marsh near southeast coast.

Jaguara; town in eastern part of province of Santa Clara.

Jaguelles, Rio; right-hand branch of Rio Sagua la Chica, in province of Santa Clara.

Jaguey, Ensenada del; small bay on west coast of province of Pinar del Rio.

Jaguey, Laguna; small lake in San Antonio peninsula, province of Pinar del Rio.

Jaguey, Laguna del; lake in southern part of province of Puerto Principe, municipal district of Ciego de Avila.

Jaguey Punta; point on south coast of province of Santa Clara.

Jaguey Grande; municipal district in province of Matanzas. Area 326 square miles. Population 5,853.

Jaguey Grande; village in municipal district of same name, in province of Matanzas.

Jaguey Grande; barrio in municipal district of Jaguey Grande, province of Matanzas. Population 1,999.

Jagueyes, Arroyo; stream heading in Loma de las Muletas and flowing to coast, in municipal district of Gibara, province of Santiago.

Jaibo; village in municipal district of Guantanamo, province of Santiago.

Jaibo, Rio; left-hand branch of Guantanamo River, in Guantanamo municipal district, province of Santiago. Length 40 miles.

Jaibo Abajo; barrio in municipal district of Guantanamo, province of Santiago. Population 320.

Jaibo, Arriba; barrio in municipal district of Guantanamo, province of Santiago. Population 296.

Jaimanita; village in Habana Province.

Jaimanitas; barrio in municipal district of Cano, province of Habana.

Jamaica; village in Habana Province.

Jamaica; village in municipal district of Guantanamo, province of Santiago.

Jamaica; barrio in municipal district of Guantanamo, province of Santiago. Population 2,151.

Jamaica; barrio in municipal district of San Jose de las Lajas, province of Habana.

Jamal; barrio in municipal district of Baracoa, province of Santiago. Population 1,024.

Jaragua, Punta; point on north coast of municipal district of Baracoa, province of Santiago.

Jarahueca; village in municipal district of Alto Songo, province of Santiago.

Jarahueca; barrio in municipal district of Alto Songo, province of Santiago. Population 544.

Jarahueca, Rio; right-hand branch of Rio de los Joturus, in Santiago Province.

Jarao, Arroyo; small branch of Rio Gayajana, in municipal district of Sancti Spiritus, province of Santa Clara.

Jarico, Arroyo; short right-hand branch of Rio Sevilla, in province of Puerto Principe.

Jarro, Bahia de; small bay on north coast of Santiago Province, municipal district of Holguin.

Jarro, Punta; point on south coast of province of Santiago, municipal district of Manzanillo.

Jarrola, Laguna; small lake in San Antonio peninsula, province of Pinar del Rio.

Jaruco; municipal district in province of Habana. Area 74 square miles. Population 4,076.

Jaruco; an interior city of Habana. Population 1,139.

Jaruco; barrio in municipal district of Jaruco, province of Habana.

Jaruco, Punta Conde; point on south coast of province of Santiago.

Jaruco, Rio; river in Habana Province flowing to north coast.

Jatia, Estero la; stream flowing to west coast in municipal district of Puerto Principe, province of Puerto Principe.

Jatibonico del Norte, Rio; river in northern part of province of Puerto Principe flowing to north coast. Length 35 miles.

Jatibonico del Sur, Rio; river heading in Sierra de Matahambre, in province of Santa Clara, and flowing south between provinces of Santa Clara and Puerto Principe to coast. Length 55 miles.

Jatibonico, Sierra de; mountains in western part of province of Puerto Principe.

Jaula; barrio in municipal district of Tapaste, province of Habana.

Jaula, Laguna; small lake in San Antonio peninsula, province of Pinar del Rio.

Jaula, Loma de la; hill in Habana Province.

Jerez; barrio in municipal district of Guira de Melena, province of Habana.

Jesus del Monte; village in Habana Province, suburb of Habana.

Jesus Maria; barrio in municipal district of Bejucal, province of Habana.

Jibacoa; town in western part of province of Santiago, municipal district of Manzanillo.

Jibacoa; village in Habana Province.

Jibacoa; barrio in municipal district of Manzanillo, province of Santiago. Population 2,024.

Jibacoa; barrio in municipal district of Santa Cruz del Norte, province of Habana.

Jibacoa, Rio; river in Habana Province, flowing to north coast.

Jibacoa, Rio; small branch of Rio Guanayara, in southern part of province of Santa Clara.

Jibara, Lagunas de; small lakes in municipal district of Cienfuegos, province of Santa Clara.

Jibaro; barrio in municipal district of Sancti Spiritus, province of Santa Clara. Population 433.

Jibaro, Cayo; islet north of province of Pinar del Rio.

Jicotea; barrio in municipal district of Ciego de Avila, province of Puerto Principe. Population 414.

Jicotea; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 706.

Jicotea; barrio in municipal district of San Diego del Valle, province of Santa Clara. Population 665.

Jicotea; barrio in municipal district of Santo Domingo, province of Santa Clara.

Jicotea, Arroyo; left-hand branch of Rio Sagua la Grande, in province of Santa Clara.

Jicotea, Brazo de; stream flowing to coast in western part of province of Pinar del Rio.

Jicotea, Rio; small river flowing to west coast in municipal district of Bayamo, Santiago Province.

Jicotea, Rio; river in southwestern part of province of Santiago. Heads in Sierra Maestra and flows northwestward into Buena Esperanza Bay. Length 35 miles.

Jicotea, Rio; river in province of Puerto Principe flowing to south coast. Length 30 miles.

Jigua, Rio; right-hand branch of Rio Cautillo, in municipal district of Jiguani, province of Santiago.

Jiguani; municipal district in province of Santiago. Area 495 square miles. Population 10,495.

Jiguani; village in municipal district of Jiguani, province of Santiago.

Jiguey, Rio; river in province of Puerto Principe. Heads in Sierra de Cubitas and flows northwest to coast. Length 35 miles.

Jiguiamo, Rio; left-hand branch of Rio Sagua la Grande, in province of Santa Clara. Length 20 miles.

Jimiru, Arroyo; small left-hand branch of Rio Contramaestre, in province of Puerto Principe.

Jiquiabo; barrio in municipal district of Santo Domingo, province of Santa Clara.

Jiquiabo; village in municipal district of Santo Domingo, province of Santa Clara.

Jiquimas; barrio in municipal district of Trinidad, province of Santa Clara. Population 825.

Jiquimu, Arroyo; stream flowing to north coast in province of Santa Clara.

Jiriquias, Punta de; point on north coast of Habana Province.

Joa, Ensenada de; small harbor on south coast of municipal district of Guantanamo, province of Santiago.

Jobabo; village in municipal district of Gibara, province of Santiago.

Jobabo; barrio in municipal district of Gibara, province of Santiago. Population 1,266.

Jobaco; barrio in municipal district of Mariel, province of Pinar del Rio.

Jobo; barrio in municipal district of San Nicolas, province of Habana.

Jobo, Arroyo del; right-hand branch of Rio Caunao, in municipal district of Puerto Principe, province of Puerto Principe.

Jobo, Sierra del; mountains in eastern part of province of Santiago.

Jobo, Lomas del; hills in municipal district of Artemisa, province of Pinar del Rio.

Jojo, Ensenada and **Surgidero**; small bay and anchorage on south coast of province of Santiago.

Jojo, Punta de; point on south coast of province of Santiago.

Jojo, Rio; river in eastern part of Santiago province. It heads in Sierra de Aragon and flows southeastward and southwestward to south coast. Length 30 miles.

Jorabado, Caleta del; small bay on south coast of Isla de Pinos.

Joturus, Rio de los; left-hand branch of Mayari River, in Santiago Province.

Jovellanos; *municipal district in province of Matanzas. Area 61 square miles. Population 7,529.*

Jovellanos; an interior city of province of Matanzas. Population 4,721.

Jovero, Laguna; lake in municipal district of Guane, southern part of province of Pinar del Rio.

Juaco; barrio in municipal district of Baracoa, province of Santiago. Population 1,425.

Juaco; village in southeastern part of municipal district of Baracoa, province of Santiago.

Juaco, Rio; river in eastern part of province of Santiago.

Juan Danuo, Alto de; hill on north coast of Cayo Sabinal, province of Puerto Principe.

Juan Diaz; village in northern part of municipal district of Sagua de Tanamo, province of Santiago.

Juan Diaz; barrio in municipal district of Sagua de Tanamo, province of Santiago. Population 714.

Juan Francisco, Ensenada; creek and cove on north coast of province of Santa Clara, municipal district of Las Vueltas.

Juan Gomez; barrio in municipal district of Guane, province of Pinar del Rio. Population 912.

Juan Griego, Cayos de; islands off north coast of province of Puerto Principe.

Juan Hernandez, Punta; point on south coast of province of Puerto Principe, municipal district of Moron.

Juan Lopez, Rio; river flowing to north coast in province of Santa Clara. Length 24 miles.

Juan Luis, Cayos de; group of islets south of Zapata peninsula, province of Santa Clara.

Juan Martinez, Arroyo; left-hand branch of Rio Caunao, in municipal district of Puerto Principe, province of Puerto Principe.

Juan Saez, Alta de; hill near south coast of Cayo Romano.

Juba, Caleta de la; cove on south coast of province of Santiago.

Jucaibama; town in western part of municipal district of Bayamo, province of Santiago.

Jucaral, Arroyo; small stream flowing to coast in southern part of province of Pinar del Rio.

Jucaro; town on north coast of province of Matanzas, near city of Cardenas.

Jucaro; town on south coast of province of Puerto Principe. Terminus of the Jucaro and Moron Railway.

Jucaro; barrio in municipal district of Ciego de Avila, province of Puerto Principe. Population 468.

Jucaro, Laguna; small lake in the coast swamps of province of Puerto Principe.

Jucaro, Laguna del; lake near north coast in province of Matanzas.

Jucaro, Punta del; point on south coast of province of Puerto Principe, municipal district of Moron.

Jucaro, Rio del; a distributary of Rio San Anton in northern part of province of Matanzas.

Jucaro, Surgidero; anchorage on north coast of province of Matanzas.

Judas, Cayo; small island north of province of Puerto Principe.

Judas, Punta de; point on north coast of province of Santa Clara, municipal district of Yaguajay.

Judas, Sierra de; mountains on the north coast of province of Santa Clara, municipal district of Yaguajay.

Judas de la Cunagua, Sierra de; hills in northern part of municipal district of Moron, province of Puerto Principe.

Judio, Arroyo; short left-hand branch of Rio Tana, province of Puerto Principe.

Judio, Punta del; point on north coast of Habana Province.

Julia, Punta; point on west coast of province of Santiago, municipal district of Bayamo.

Juliana, Arroyo; right-hand branch of Duaba River, in Santiago Province.

Julian Diaz; municipal district in province of Pinar del Rio. Area 103 square miles. Population 1,871.

Julian Diaz; barrio in municipal district of Julian Diaz, province of Pinar del Rio.

Julias, Cayo; island northwest of province of Pinar del Rio.

Julias, Punta; point on northwest coast of province of Pinar del Rio.

Julici, Punta; point on south coast of municipal district of Santiago de Cuba, province of Santiago.

Julici, Surgidero; anchorage on south coast of municipal district of Santiago de Cuba, province of Santiago.

Jumagua; barrio in municipal district of Sagua la Grande, province of Santa Clara. Population 2,473.

Juncal, Laguna del; lake near south coast in province of Santa Clara, municipal district of Sancti Spiritus.

Junco; town on south coast of province of Puerto Principe in municipal district of Santa Cruz del Sur.

Junco; barrio in municipal district of Santa Cruz del Sur, province of Puerto Principe. Population 1,083.

Junco, Arroyo del; stream in northern part of province of Puerto Principe, uniting with Arroyo Corrales to form Arroyo de Robles.

Junco, Punta del; point on south coast of province of Puerto Principe.

Juqui; barrio in municipal district of Santo Domingo, province of Santa Clara.

Juraco, Surgidero del; anchorage on coast of municipal district of Cobre, southern part of Santiago Province.

Juragua, Rio; small river in southern part of municipal district of Santiago de Cuba, province of Santiago.

Juraguasito; river and anchorage on southern coast of municipal district of Santiago de Cuba, province of Santiago.

Juribacoa; barrio in municipal district of Guira de Melena, province of Habana. Population 311.

Justin, Rio; river in Habana Province, flowing to north coast.

Laberinto de Doce Leguas; group of low islands south of province of Puerto Principe.

La Bija; village in municipal district of Cabezas, western part of province of Matanzas.

La Caimanera; village in municipal district of Guantanamo, on Bay of Guantanamo, province of Santiago.

La Caridad; barrio in municipal district of Holguin, province of Santiago. Population 1,063.

La Catalina; village in Habana Province.

La Ceja; barrio and village in municipal district of Mantua, province of Pinar del Rio.

La Cidra; village in municipal district of Santa Ana, province of Matanzas.

La Cruz; barrio in municipal district of Santa Clara, province of Santa Clara. Population 2,111.

La Cuaba; village in municipal district of Holguin, province of Santiago.

Ladrillo, Punta; point on south coast of province of Santa Clara at mouth of Rio Zaza.

Ladrones, Cayo; islet off north coast of province of Puerto Principe.

La Entrada; village in municipal district of Holguin, Province of Santiago.

La Esperanza, Montes de; hills in Habana Province.

La Fabrica, Punta; point on north coast of municipal district of Baracoa, province of Santiago.

La Grifa; barrio in municipal district of Guane, province of Pinar del Rio. Population 2,113.

La Guanaja; town on north coast of province of Puerto Principe in municipal district of Puerto Principe.

Laguna Blanca; town in municipal district of Bayamo, province of Santiago, near city of Bayamo.

Laguna Blanca; barrio in municipal district of Bayamo, province of Santiago. Population 1,856.

Laguna, Cayo; islet south of province of Santa Clara.

Laguna de Piedra; barrio in municipal district of Viñales, province of Pinar del Rio. Population 2,328.

Lagunas; barrio in municipal district of Caney, province of Santiago.

Lagunillas; town in municipal district of Cardenas, province of Matanzas.

Lagunillas; barrio in municipal district of San Juan y Martinez, province of Pinar del Rio. Population 1,238.

La Isabela; town at mouth of Rio Sagua la Grande, on north coast of province of Santa Clara.

La Jagua; village in municipal district of Consolacion del Norte, province of Pinar del Rio.

La Jagua; barrio in municipal district of Consolacion del Norte, province of Pinar del Rio. Population 1,567.

La Jagua; barrio in municipal district of Consolacion del Sur, province of Pinar del Rio.

Lajas (Las); municipal district in province of Santa Clara. Area 136 square miles. Population 9,603.

Lajas; village in municipal district of Consolacion del Sur, province of Pinar del Rio.

Lajas; village in municipal district of Lajas, province of Santa Clara.

Lajas; barrio in municipal district of Consolacion del Sur, province of Pinar del Rio.

Lajas; barrio in municipal district of Guantanamo, province of Santiago. Population 1,371.

Lajas, Punta de las; point on north coast of Cayo Sabinal, province of Puerto Principe.

Lajas, Rio; small branch of Rio Turquina, in southern part of Santiago Province.

Lajatas, Rio; right-hand branch of Rio Damuji, in province of Santa Clara.

La Leña; village in municipal district of Consolacion del Sur, province of Pinar del Rio.

La Luz; village in municipal district of San Luis, province of Santiago.

La Luz; barrio in municipal district of San Luis, province of Santiago. Population 618.

La Luz, Rio; branch of Rio Santa Barbara, in province of Matanzas.

La Luz, Rio; tributary to Rio Nuevo Mayabeque, in Habana Province.

La Majagua, Punta; point on south coast of Habana Province.

La Majagua, Rio; river in Habana Province, flowing to south coast.

La Palma; village in municipal district of Sabanilla, province of Matanzas.

La Palma; barrio and village in municipal district of Consolacion del Norte, province of Pinar del Rio.

La Palma; barrio in municipal district of Holguin, province of Santiago. Population 2,101.

La Paz; barrio in municipal district of Ceiba del Agua, province of Habana.

La Paz; barrio in municipal district of Alquizar, province of Habana. Population 1,011.

La Plata, Ensenada and **Rio**; river and small harbor on south coast of province of Santiago, municipal district of Cobre.

La Quinta; village in municipal district of Las Vueltas, northern part of province of Santa Clara.

Larga, Bahia; bay on south coast of municipal district of Cobre, province of Santiago.

Laga, Caleta; cove on south coast of San Antonio Peninsula, province of Pinar del Rio.

Larga, Laguna; lake in municipal district of Guane, southern part of province of Pinar del Rio.

Largo, Arroyo; right-hand branch of Duaba River, province of Santiago.

Larguela, Laguna; lake in municipal district of Guane, southern part of province of Pinar del Rio.

La Salud; village in Habana province.

Las Bocas; village in municipal district of Gibara, province of Santiago.

Las Cuchillas; barrio in municipal district of Palma Soriano, province of Santiago. Population 1,988.

La Sierra; village in municipal district of Los Palacios, province of Pinar del Rio.

La Sierra; village near south coast in municipal district of Cienfuegos, province of Santa Clara.

La Sierra; barrio in municipal district of Santa Cruz del Norte, province of Habana.

Las Lajas; village in Guantanamo municipal district, near Guantanamo Bay, province of Santiago.

Las Mangas; village in municipal district of Candelaria, province of Pinar del Rio.

Las Mangas; barrio in municipal district of Candelaria, province of Pinar del Rio. Population 1,280.

Las Minas; village in northern part of province of Matanzas.

La Socarrona; hills in municipal district of Mayari, province of Santiago.

Las Ovas; village in municipal district of Pinar del Rio, province of Pinar del Rio.

Las Pozas; village near north coast in municipal district of Bahia Honda, province of Pinar del Rio.

Las Vegas; village in Habana Province.

Las Vegas, Rio; river in Habana Province, flowing to south coast.

Las Yeguas; town in western part of municipal district of Puerto Principe, province of Puerto Principe.

La Teja; village on north coast in municipal district of Marfi, province of Matanzas.

La Teja; barrio in municipal district of Marti, province of Matanzas. Population 695.

Launaito, Rio; small river near south coast, in province of Santa Clara.

La Union; village in western part of province of Matanzas.

Lavanderas, Punta; point on north coast of province of Pinar del Rio.

La Vega; village in municipal district of Holguin, Santiago Province.

La Vivora; village in Habana Province.

La Yaba; town in province of Puerto Principe, near the city of Puerto Principe.

Lazarino, Arroyo; left-hand branch of Tio Bio, in municipal district of Mayari, province of Santiago.

Lazaro; barrio in municipal district of Mantua, province of Pinar del Rio.

Lazaro, Rio; left-hand branch of Rio Caunao, in municipal district of Puerto Principe, province of Puerto Principe.

Lazaro Lopez; town in western part of province of Puerto Principe, municipal district of Ciego de Avila.

Lazaro Lopez; barrio in municipal district of Ciego de Avila, province of Puerto Principe. Population 1,121.

Lazos, Ensenada los; small bay on western coast of Pinar del Rio.

Lebisa, Bahia de; bay on north coast of province of Santiago, municipal district of Mayari.

Lebisa, Cayo; small island off north coast of province of Pinar del Rio.

Lebisa, Rio; river in municipal district of Mayari, province of Santiago. Rises in Micaro Mountains and flows to north coast.

Lebistica, Rio; short stream flowing to north coast in municipal district of Mayari, Santiago Province.

Lechuga; barrio and village in municipal district of Managua, province of Habana.

Lechuga, Rio; branch of Rio Almendares, in Habana Province.

Lechuza, Arroyo; right-hand branch of Yumuri River, in province of Santiago.

Legua, Arroyo de la; right-hand branch of Rio de las Caravelas, near coast, in municipal district of Nuevitas, Santiago Province.

Lelderos, Arroyo los; left-hand branch of Rio de Guayabano, municipal district of Guantanamo, province of Santiago.

Leña; barrio in municipal district of Consolacion del Sur, province of Pinar del Rio. Population 914.

Leña, Cayos de la; group of islands north of San Antonio Peninsula, province of Pinar del Rio.

Leones, Punta; point on south coast of San Antonio Peninsula, province of Pinar del Rio.

Lima; barrio in municipal district of Cabezas, province of Matanzas. Population 612.

Limon, Sierra de; mountains in western part of province of Matanzas.

Limonar; an interior city of Matanzas. Population 2,876.

Limonar; village in municipal district of Guamacaro, province of Matanzas.

Limones; town in municipal district of Puerto Principe, province of Puerto Principe.

Limones; barrio and village in municipal district of Los Palacios, province of Pinar del Rio.

Limones; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 830.

Limones; barrio in municipal district of Rodas, province of Santa Clara. Population 2,535.

Limones, Arroyo; stream sinking in Laguna de Baja, in province of Santa Clara.

Limones, Arroyo; right-hand branch of Rio Grande, in province of Puerto Principe.

Limones, Loma; hill in municipal district of Ceja de Pablo, province of Santa Clara.

Limones, Punta; point on north coast of province of Santa Clara.

Limones, Rio; right-hand branch of Rio Juan Lopez, in municipal district of Ceja de Pablo, province of Santa Clara.

Limones, Rio; river in southwestern part of province of Santiago, flowing to coast.

Limones, Sierra de; mountains in municipal district of Los Palacios, province of Pinar del Rio.

Limpio Grande, Arroyo; stream in municipal district of Ciego de Avila, province of Puerto Principe.

Linares, Sierra de; mountains in municipal district of San Diego de los Baños, province of Pinar del Rio.

Linch; barrio in municipal district of Macuriges, province of Matanzas.

Lindero, Arroyo del; right-hand branch of Rio Cascorro, province of Puerto Principe.

Lindero, Punta del; point on north coast of Isla de Pinos.

Lisa; barrio in municipal district of Marianao, province of Habana. Population 680.

Litoral de los Pesqueros, Cienego; large marsh in southwestern part of province of Pinar del Rio.

Llanda; village in municipal district of San Luis, province of Pinar del Rio.

Llanda, barrio in municipal district of San Luis, province of Pinar del Rio. Population 415.

Llamitas, Arroyo; small stream flowing to south coast in municipal district of Cobre, province of Santiago.

Llimite, Punta de; point on south coast of Isla de Pinos.

Loma, Cayo la; islet off north coast of province of Pinar del Rio.

Loma Cruz; village in municipal district of Santa Clara, province of Santa Clara.

Loma de Tierra; village in Habana Province.

Loma del Gato; barrio in municipal district of Alto Songo, province of Santiago. Population 585.

Lomas; barrio in municipal district of Candelaria, province of Pinar del Rio.

Lomas de Candela; village in Habana Province.

Lomas Grandes; village in municipal district of Camarones, province of Santa Clara.

Lomas Grandes; barrio in municipal district of San Fernando, province of Santa Clara. Population 786.

Lopez; barrio in municipal district of Jaguey Grande, province of Matanzas. Population 1,445.

Los Acostas; barrio in municipal district of Guane, province of Pinar del Rio.

Los Dorados; village in municipal district of Palma Soriano, province of Santiago.

Los Guiros; village in municipal district of Holguin, Santiago Province.

Los Palacios; municipal district in province of Pinar del Rio. Area 199 square miles. Population 2,456.

Los Palacios; town in municipal district of Los Palacios, province of Pinar del Rio.

Los Palacios; barrio in municipal district of Los Palacios, province of Pinar del Rio. Population 1,549.

Los Patos; village in Habana Province.

Los Pilos; village on Buey River, in western part of municipal district of Bayamo, province of Santiago.

Los Puentas; barrio in municipal district of Consolacion del Norte, province of Pinar del Rio. Population 594.

Los Quemado; village in Habana Province.

Lucas, Cayo; island off north coast of province of Santa Clara.

Lucia; barrio in municipal district of Bolondron, province of Matanzas.

Lucrecia, Ensenado del; small bay on coast of municipal district of Gibara, northern part of province of Santiago.

Lugareno; barrio in municipal district of Nuevitas, province of Puerto Principe. Population 1,510.

Lugo, Caleta de; cove on west coast of Isla de Pinos.

Lugo, Punta de; point on west coast of Isla de Pinos.

Luis Lazo; barrio in municipal district of San Juan y Martinez, province of Pinar del Rio. Population 4,193.

Luis Varona, Arroyo; right-hand branch of Rio Duran, province of Puerto Principe.

Luna, Punta; point on south coast of province of Santa Clara, at mouth of Rio Arimao.

Lursa, Montes de la; hills in Habana Province.

Luyano; village in Habana Province.

Mabujina, Rio; right-hand branch of Rio Manati in province of Santa Clara.

Macagua; municipal district in province of Matanzas. Area 105 square miles. Population 5,042.

Macagua; an interior city of Matanzas. Population 1,467.

Macagual; barrio in municipal district of Mariel, province of Pinar del Rio.

Macaguaney, Arroyo; right-hand branch of Duaba River, province of Santiago.

Macambo, Rio; river in southern part of municipal district of Baracoa, province of Santiago.

Maceo; *barrio in* municipal district of Jaruco, province of Habana.

[illegible]hilo, Cayo; island north of province of Matanzas.

Macho, Cayo; island north of province of Matanzas.

Macho, Surgidero; anchorage on south coast of municipal district of Cobre, Santiago Province.

Macias, Punta de; point on north coast of Habana Province.

Macio; village on south coast of province of Santiago in municipal district of Cobre.

Macio; barrio in municipal district of Cobre, province of Santiago. Population 92.

Macio, Arroyo; creek in southern part of municipal district of Cobre, province of Santiago.

Macio, Laguna de; small lake near coast in municipal district of Consolacion del Sur, southern part of province of Pinar del Rio.

Macio, Rio del; river flowing to south coast in municipal district of Gobre, Santiago Province.

Macio, Surgidero del; anchorage on south coast of province of Santiago, municipal district of Cobre.

Macuge, Rio; left-hand branch of Rio Cauto, province of Santiago, municipal district of Cobre.

Macujual; village in municipal district of Guanajay, northern part of province of Pinar del Rio.

Macuriges; municipal district in province of Matanzas. Area 243 square miles. Population 10,405.

Macuriges; village in western part of municipal district of Guantanamo, province of Santiago.

Macuriges; village in municipal district of Los Palacios, southern part of province of Pinar del Rio.

Macuriges; barrio in municipal district of Guantanamo, province of Santiago. Population 492.

Macuriges; barrio in municipal district of Los Palacios, province of Pinar del Rio. Population 238.

Macuriges, Laguna; lake in municipal district of Los Palacios, province of Pinar del Rio.

Macuriges, Laguna; lake in municipal district of Macuriges, province of Matanzas.

Macuriges, Rio; left-hand branch of Rio Guantanamo, in municipal district of Guantanamo, province of Santiago.

Macuryes, Boca; small bay on west coast of province of Puerto Principe.

Macuryes, Punta; point on west coast of province of Puerto Principe.

Madruga; municipal district in province of Habana. Area 58 square miles. Population 3,744.

Madruga; an interior city of Habana. Population 2,004.

Maestra, Sierra; highest and longest range of mountains in Cuba. They extend from east to west along the southern coast of the province of Santiago, attaining in many parts a height exceeding 5,000 feet, and culminating in Pico Turquino, reputed to have an altitude of 8,320 feet.

Magabuna, Arroyo; right-hand branch of Rio Zaza, in southern part of province of Santa Clara.

Magancilla, Arroyo; left-hand branch of Arroyo la Concepcion, province of Santiago.

Magarabomba; town in western part of municipal district of Puerto Principe, province of Puerto Principe.

Magarabomba; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 1,304.

Magdalena; village in municipal district of Cabezas, western part of province of Matanzas.

Magdalena; barrio in municipal district of Cabezas, province of Matanzas. Population 229.

Magdalena, Rio de la; river in southern part of province of Santa Clara, sinking in Cienega Zapata.

Magdalena, Surgidero and Rio; river and anchorage in southern part of municipal district of Cobre, province of Santiago.

Mageres, Arroyo las; small branch of Rio Santa Rosa in western part of province of Pinar del Rio.

Magibacoa, Rio; left-hand branch of Rio Naranjo in municipal district of Holguin, Santiago Province.

Maguaraya Abajo; barrio in municipal district of San Diego del Valle, province of Santa Clara.

Maguaraya Arriba; barrio in municipal district of San Diego del Valle, province of Santa Clara.

Maguey, Sierra del; mountains in municipal district of Guantanamo, province of Santiago.

Maisi; village near east coast of municipal district of Baracoa, province of Santiago.

Maisi; barrio in municipal district of Baracoa, province of Santiago. Population 108.

Maisi, Punta; point on east coast of province of Santiago, the easternmost point of Cuba.

Maisi, Rio; river in eastern part of municipal district of Baracoa, province of Santiago.

Majagebo, Rio; right-hand branch of Rio Cauto, province of Santiago.

Majagua, Punta de la; point on west coast of Isla de Pinos.

Majagua, Rio; river flowing to south coast in province of Habana.

Majanda, Ensenada de; small bay on south coast of province of Pinar del Rio.

Majanda, Punta; point on north coast of province of Santiago.

Majangua; barrio in municipal district of Madruga, province of Habana.

Mal Abrigo, Cayo; small island southwest of province of Puerto Principe.

Mala Fama, Arroyo; stream flowing to south coast in municipal district of Puerto Principe, province of Puerto Principe.

Malagua, Arroyo; small branch of Rio Manicaragua in southern part of province of Santa Clara.

Malaguela, Punta; point on north coast of Santiago Province, municipal district of Puerto Padre.

Malahambre, Punta; point on north coast of province of Santiago.

Mal Año, Punta; point on south coast of province of Santiago.

Mala Noche; barrio in municipal district of Holguin, province of Santiago. Population 703.

Mala Rueca, Rio; river in province of Puerto Principe, flowing to south coast. Length 25 miles.

Malas Aguas; village near north coast in municipal district of Mantua, province of Pinar del Rio.

Malas Aguas, Ensenada; small bay on north coast of Pinar del Rio.

Malas Aguas, Punta; point on north coast of province of Pinar del Rio.

Malas Aguas, Rio; river flowing to north coast in western part of province of Pinar del Rio.

Male, Cayos del; islets off south coast of province of Puerto Principe.

Mal Pais, Rio de; left-hand branch of Rio de Santa Fe, Isla de Pinos.

Maltiempo; barrio in municipal district of Cruces, province of Santa Clara. Population 2,284.

Mamey Duro; barrio in municipal district of Bainoa, province of Habana.

Mameyes; village in municipal district of Cardenas, province of Matanzas.

Mamposton, Rio; branch of Rio Nuevo Mayabeque in Habana Province.

Manacal, Rio; short coast river in western part of province of Santiago.

Manacal, Punta; point on west coast of province of Santiago.

Manacas; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 1,540.

Manacas; barrio in municipal district of Cobre, province of Santiago. Population 1,426.

Manacas; barrio in municipal district of Sancti Spiritus, province of Santa Clara. Population 475.

Manacas; barrio and village in municipal district of Santo Domingo, province of Santa Clara.

Manacas, Arroyo; left-hand branch of Rio Piedras, in province of Matanzas.

Manacas, Arroyo; left-hand branch of Arroyo Pablo, province of Puerto Principe.

Manacas, Arroyo; left-hand branch of Rio Contramaestra in municipal district of Jiguani in Santiago Province.

Managas; town in western part of municipal district of Bayamo, province of Santiago.

Managua; municipal district in province of Habana. Area 58 square miles. Population 2,887.

Managua; an interior city of Habana. Population 1,063.

Managua, Rio; left-hand branch of Rio Cautillo in municipal district of Bayamo, Santiago Province.

Managua, Rio; left-hand branch of Yumuri River in province of Santiago.

Managua, Tetas de; hills in Habana Province.

Managuaco; village in municipal district of Holguin, Santiago Province.

Managuaco; barrio in municipal district of San Jose de las Lajas, province of Habana.

Managuimba, Rio; river flowing to north coast in province of Santa Clara. Length 15 miles.

Manaja, Arroyo; small stream near west coast in province of Pinar del Rio.

Manaquitas, Arroyo; left-hand branch of Rio Sagua la Grande in province of Santa Clara.

Manati; town in northern part of municipal district of Puerto Padre, province of Santiago.

Manati; barrio in municipal district of Puerto Padre, province of Santiago. Population 1,064.

Manati, Estero; inlet and creek on west coast of province of Puerto Principe.

Manati, Mesa; near north coast of municipal district of Puerto Padre, province of Santiago.

Manati, Punta; point on south coast of municipal district of Guantanamo, province of Santiago.

Manati, Punta; point on south coast of province of Santiago, municipal district of Cobre.

Manati, Punta; point on north coast of Santiago Province.

Manati, Punta; point on south coast of province of Santa Clara, near mouth of Rio Manati.

Manati, Rio; small river flowing to south coast in municipal district of Cobre, province of Santiago.

Manati, Rio; river flowing to south coast in province of Santa Clara, municipal district of Trinidad. Length 47 miles.

Manati Oriental, Punta; point on south coast of province of Santa Clara, municipal district of Sancti Spiritus.

Manautuaba; village in municipal district of Cobre, province of Santiago.

Mandinga; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 488.

Mandinga; village in municipal district of Cienfuegos, province of Santa Clara.

Mandinga; barrio in municipal district of Baracoa, province of Santiago. Population 910.

Maneaderos, Cerro de los; hill in western part of Isla de Pinos.

Manglarito, Punta; point on Peninsula de la Torre, north coast of province of Santiago.

Mangle, Punta del; point on north coast of municipal district of Baracoa, province of Santiago.

Mangle, Punta de; point on east coast of province of Santiago.

Mangles, Punta; point on north coast of Habana Province.

Mangles Altas, Punta; point on south coast of province of Santa Clara.

Mangles, Islas de; group of small islands north of Isla de Pinos.

Manglito, Punta del; point on east coast of municipal district of Gibara, province of Santiago.

Mango; barrio in municipal district of San Diego del Valle, province of Santa Clara. Population 302.

Mangorito, Punta; point on north coast of province of Santiago.

Manguito; a city of Matanzas. Population 1,534.

Manguito; barrio in municipal district of Palmillas, province of Matanzas. Population 3,289.

Maniabo, Rio; right-hand branch of Yarey River in municipal district of Puerto Principe, province of Santiago.

Maniabon; town in municipal district of Puerto Padre, province of Santiago.

Maniabon; barrio in municipal district of Puerto Padre, province of Santiago. Population 995.

Manicaragua; town in municipal district of Santa Clara, province of Santa Clara.

Manicaragua; barrio in municipal district of Santa Clara, province of Santa Clara. Population 2,916.

Manicaragua, Rio; right-hand branch of Rio Arimao in southern part of province of Santa Clara.

Manimani; barrio and village in municipal district of Bahia Honda, province of Pinar del Rio.

Manolica, Punta; point on south coast of Santiago Province, municipal district of Cobre.

Manteco, Arroyo; right-hand branch of Rio la Rioja, Santiago Province.

Mantilla; village in Habana Province.

Mantua; municipal district in province of Pinar del Rio. Area 634 square miles. Population 8,366.

Mantua; barrio and village in municipal district of Mantua, province of Pinar del Rio.

Mantua, Rio; river heading in Sierra de Francisco and flowing to west coast in province of Pinar del Rio. Length 33 miles.

Mantua, Rio; short stream flowing to south coast in province of Pinar del Rio.

Manui, Cayos la; group of small islands off north coast of province of Matanzas.

Manzanillo; municipal district in province of Santiago. Area 491 square miles. Population 32,288.

Manzanillo; a coast city of Santiago. Population 14,464.

Mapos, Laguna; lake near south coast of province of Santa Clara in municipal district of Sancti Spiritus.

Mapurisi, Punta; point on north coast of municipal district of Baracoa, province of Santiago.

Maracayero, Punta del; point on south coast of Isla de Pinos.

Maraguan; town in municipal district of Puerto Principe, province of Puerto *Principe*.

Maraguan; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 1,110.

Marañon, Arroyo; right-hand branch of Rio Coscorro, province of Puerto Principe.

Maravi, Rio; left-hand branch of Toa River in Santiago Province.

Mar, Cayos de la; islands north of province of Santa Clara.

Mar Celina, Punta; point on north coast of province of Puerto Principe.

Marchon, Caleta de; small bay on north coast of Santiago Province, municipal district of Puerto Padre.

Marcos, Arroyo; small left-hand branch of Rio Jobabo in Santiago Province.

Marcos Vazquez; village in municipal district of Pinar del Rio, province of Pinar del Rio.

Marcos Vazquez; barrio in municipal district of Pinar del Rio, province of Pinar del Rio. Population 974.

Margarita, Arroyo; stream in municipal district of Gibara, province of Santiago.

Mariana, Sierra de; mountains in eastern part of municipal district of Guantanamo, province of Santiago.

Marianao; municipal district in province of Habana. Area 25 square miles. Population 8,593.

Marianao; city near north coast of Habana. Population 5,416.

Marianas, Lomas; hills in Habana Province.

Maria Rodriguez, Sierra de; mountains in municipal district of Santa Clara, province of Santa Clara.

Mariel; municipal district in province of Pinar del Rio. Area 95 square miles. Population 3,631.

Mariel; village in municipal district of Bahia Honda, on northern coast of province of Pinar del Rio.

Mariel; barrio in municipal district of Mariel, province of Pinar del Rio.

Mariel, Bahia; bay on north coast of province of Pinar del Rio.

Marroqui; town in western part of province of Puerto Principe, municipal district of Moron.

Marroquin; barrio in municipal district of Moron, province of Puerto Principe. Population 1,073.

Marta, Arroyo; right-hand branch of Rio Grande, in municipal district of Sagua de Tanamo, province of Santiago.

Marti; municipal district in province of Matanzas. Area 362 square miles. Population 8,905.

Marti, Norte; barrio in municipal district of Marti, province of Matanzas. Population 2,495.

Marti, Sur; barrio in municipal district of Marti, province of Matanzas. Population 396.

Martillo; village in municipal district of Holguin, Santiago Province.

Martillo, Punta; point on west coast of province of Santiago.

Martin, Cayo; small island about 12 miles north of province of Puerto Principe.

Martinas; barrio in municipal district of Guane, province of Pinar del Rio. Population 1,746.

Masio, Cayo del; island off south coast of province of Santa Clara in Ensenada de Cazones.

Mata; village on north coast of Santiago Province in municipal district of Baracoa.

Mata; village in municipal district of Calabazar, province of Santa Clara.

Mata; barrio in municipal district of Baracoa, province of Santiago. Population 738.

Mata, Punta de; point on north coast of province of Santiago.

Mata, Rio; small river in northern part of municipal district of Baracoa, province of Santiago.

Matagua, Arroyo; left-hand branch of Rio Arimao in southern part of province of Santa Clara.

Matahambre, Arroyo; small left-hand branch of Rio Malas Aguas, western part of province of Pinar del Rio.

Matahambre, Cayo: islet south of Zapata Peninsula, province of Santa Clara.

Matahambre, Laguna; small lake near north coast in municipal district of Cabañas, province of Pinar del Rio.

Matahambre, Punta de; point on Zapata Peninsula, south coast of province of Santa Clara.

Matahambre, Sierra de; mountains in northeastern part of province of Santa Clara.

Matamora, Montes de; mountains in municipal district of Holguin, province of Santiago.

Matamoras, Rio; right-hand branch of Rio Holguin, municipal district of Holguin, province of Santiago. Length 18 miles.

Matanceros, Cayo; small island north of province of Matanzas.

Matanzas; a province of Cuba, the smallest in area with the exception of Habana. It lies east of that province and is limited on the east by the province of Santa Clara. Its area is 3,700 square miles. Its surface is for the most part undulating or rolling. The population numbered in 1899, 202,214, the number of inhabitants to the square mile being 55. The province contains several cities of magnitude, whose population collectively forms 29 per cent of that of the province. Males are in excess of females to the extent of 3 per cent. Fifty-one per cent of the total population is composed of native-born whites, 9 per cent of foreign-born, and not less than 40 per cent of colored. The illiterate form 35 per cent of the entire population. The province is divided into 24 municipal districts. The capital and chief city is Matanzas, on the north coast.

Matanzas; municipal district in province of Matanzas. Area 320 square miles. Population 45,282.

Matanzas; coast city and capital of province of Matanzas. Population 36,374.

Matanzas, Bahia; bay on north coast of province of Matanzas.

Mata y Barro; barrio in municipal district of Calabazar, province of Santa Clara. Population 1,267.

Matemillas, Punta; point on north coast of Cayo Sabinal, province of Puerto Principe.

Matias, Cayo; islet east of Isla de Pinos.

Matochin, Punta; point on north coast of province of Santiago.

Maximo Gomez; municipal district in province of Matanzas. Area 152 square miles. Population 4,046.

Maximo Gomez; an interior city of Matanzas. Population 1,743.

Maximo Gomez; barrio in municipal district of Maximo Gomez, province of Matanzas. Population 2,292.

Maya; barrio in municipal district of Alto Songo, province of Santiago.

Maya, Punta; point on north coast of province of Matanzas.

Mayabe; village in municipal district of Holguin, province of Santiago.

Mayabequa, Rio; river in Habana Province flowing to south coast.

Mayabon; barrio in municipal district of Macagua, province of Matanzas. Population 1,092.

Mayabon, Rio; left-hand branch of Rio Rosario, province of Matanzas.

Mayaguano; barrio in municipal district of Batabano, province of Habana. Population 352.

Mayajigua; town in municipal district of Yaguajay, northeastern part of province of Santa Clara.

Mayajigua; barrio in municipal district of Yaguajay, province of Santa Clara. *Population 1,284.*

Mayanabo, Ensenada de; bay on north coast of province of Puerto Principe, in municipal district of Nuevitas.

Mayari; municipal district in province of Santiago. Area 1,009 square miles. Population 8,504.

Mayari; city near north coast in province of Santiago. Population 1,821.

Mayari; barrio in municipal district of San Cristobal, province of Pinar del Rio.

Mayari, Rio; river in Santiago province. Heads in Montes Seboruco and flows west and north into Bahia de Nipe. Length 45 miles.

Mayari Arriba; barrio in municipal district of Alto Songo, province of Santiago. Population 975.

Medanos, Punta Los; point on north coast of municipal district of Sagua de Tanamo, province of Santiago.

Media Casa; point on south coast of province of Pinar del Rio.

Media Luna; barrio in municipal district of Manzanillo, province of Santiago. Population 3,319.

Media Luna, Ensenada; small bay on west coast of municipal district of Manzanillo, province of Santiago.

Medidas; village in municipal district of Rodas, province of Santa Clara.

Medidas; barrio in municipal district of Rodas, province of Santa Clara. Population 1,327.

Medio, Farallon del; hills in eastern part of municipal district of Baracoa, province of Santiago.

Medio, Rio del; river flowing to coast in western part of province of Pinar del Rio.

Mejias, Laguna; small lake in municipal district of Holguin, province of Santiago.

Melena; an interior city of Habana Province. Population 5,016.

Melena; barrio in municipal district of Guira de Melena, province of Habana. Population 1,452.

Melena del Sur; municipal district in province of Habana. Area 137 square miles. Population 3,207.

Melones, Laguna Los; lake in San Antonio peninsula, western part of province of Pinar del Rio.

Melonicos, Sierra; mountains near south coast of municipal district of Baracoa, province of Santiago.

Memlo, Cayo; islet north of province of Matanzas.

Menchaca, Arroyo; stream flowing to south coast in municipal district of Ciego de Avila, province of Puerto Principe.

Mendez Capote; municipal district in province of Matanzas. Area 117 square miles. Population 2,158.

Mendez Capote 1; barrio in municipal district of Mendez Capote, province of Matanzas. Population 812.

Mendez Capote 2; barrio in municipal district of Mendez Capote, province of Matanzas. Population 425.

Mendoza, Monte de; hill in Habana Province.

Meneses; village in northern part of province of Santa Clara, municipal district of Yaguajay.

Meneses; barrio in municipal district of Yaguajay, province of Santa Clara. Population 1,658.

Meneses y Guelo, Sierra de; mountains near north coast in province of Santa Clara.

Menocal, Loma; hill in Habana Province.

Mercado; barrio in municipal district of Guantanamo, province of Santiago. Population 915.

Mercedes, Arroyo Las; small left-hand branch of Rio Samaraguacon in province of Puerto Principe.

Mercedita de Mojica, Loma; hill near north coast in municipal district of Mantua, province of Pinar del Rio.

Micaro, Sierra de; mountains in eastern part of municipal district of Mayari, province of Santiago.

Mico, Loma del; hill in western part of municipal district of Sagua de Tanamo, province of Santiago.

Miel, Rio; small stream in northern part of municipal district of Baracoa, Santiago Province.

Miguel; village in northern part of municipal district of Sagua de Tanamo, province of Santiago.

Miguel; barrio in municipal district of Sagua de Tanamo, province of Santiago. Population 665.

Miguel, Arroyo; right-hand branch of Rio la Rioja, in Santiago Province.

Miguel, Rio; river in municipal district of Sagua de Tanamo, province of Santiago.

Mijial, Arroyo; small branch of Arroyo Yagua, in province of Santa Clara.

Mijias, Rio; right-hand branch of Rio Baguano in municipal district of Holguin, Santiago Province.

Mimanima, Surgidero de; anchorage on south coast of municipal district of Cobre, Santiago Province.

Minas; village in Habana Province.

Minas; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 2,318.

Minas; barrio in municipal district of San Cristobal, province of Pinar del Rio.

Minas, Arroyo; small branch of Arroyo los Pasos, in municipal district of Holguin, province of Santiago.

Minas, Arroyo; branch of Arroyo del Macho, in province of Puerto Principe.

Minas, Rio de las; left-hand branch of the Sabanilla River, in northern part of Santiago Province.

Minas y San German, Sierra de las; mountains in eastern part of Santiago Province.

Mira Cielos; barrio in municipal district of Candelaria, province of Pinar del Rio.

Miraflores, Arroyo; left-hand branch of Rio Caunao in municipal district of Moron, province of Puerto Principe.

Moa, Cayo; islet off north coast of municipal district of Baracoa, province of Santiago.

Moa, Rio de; river in province of Santiago. Heads in Cuchillas de Toa and flows north to coast. Length 20 miles.

Moa, Sierra de; mountains in northwestern part of municipal district of Baracoa, province of Santiago.

Mogel, Punta del; hill in municipal district of Jiguani, province of Santiago.

Mogon, Arroyo; left-hand branch of Rio Contramaestra in municipal district of Jiguani, province of Santiago.

Moja, Punta; point on west coast of province of Santiago, municipal district of Bayamo.

Moja Bragas, Cayos; group of small islands north of province of Santa Clara and between it and Cayo Fragoso.

Mojacasabe, Arroyo; right-hand branch of Rio los Gueros in province of Puerto Principe.

Mojacasabe, Arroyo; short left-hand branch of Rio de las Caravelas in municipal district of Puerto Principe, province of Puerto Principe.

Mojon, Arroyo; right-hand branch of Rio Muñoz, province of Puerto Principe.

Mola, Rio; river flowing to south coast in municipal district of Manzanillo, Santiago Province.

Molas, Punta de; point at extremity of Peninsula de Hicacos, on north coast of Matanzas.

Molina; barrio in municipal district of Mariel, province of Pinar del Rio.

Molina, Lomas de; hills in Habana Province.

Moncadero, Arroyo; small right-hand branch of Rio Cuyaguateje in western part of province of Pinar del Rio.

Mondejar; barrio in municipal district of Sabanilla, province of Matanzas.

Monjas; barrio in municipal district of San Antonio de los Baños, province of Habana. Population 925.

Mono, Cayo; islet north of province of Matanzas.

Monte, Cerro del; hill in central part of Isla de Pinos.

Monte, Laguna del; small lake in southeastern part of municipal district of Puerto Principe, province of Puerto Principe.

Monte Alto; barrio in municipal district of Macagua, province of Matanzas. Population 680.

Monte Cristo; village in southeastern part of municipal district of Baracoa, province of Santiago.

Monte Cristo; barrio in municipal district of Baracoa, province of Santiago. Population 739.

Monte dos Leguas; barrio in municipal district of San Luis, province of Santiago. Population 2,013.

Montefirme; barrio in municipal district of Cruces, province of Santa Clara. Population 678.

Monte Gorda, Punta; point on west coast of municipal district of Bayamo, province of Santiago.

Monte Oscuro, Rio; left-hand branch of Rio Cabreras, Santiago Province.

Montezuelo; village on river of same name in municipal district of Mantua, province of Pinar del Rio.

Montezuelo; barrio in municipal district of Mantua, province of Pinar del Rio.

Montezuelo, Rio; left-hand branch of Rio Mantua in western part of province of Pinar del Rio.

Mora, Arroyo; small branch of Arroyo Biajacas in southern part of province of Puerto Principe.

Mora, Ensenada de; small bay on south coast of municipal district of Manzanillo, Santiago Province.

Mora, Punta; point on south coast of Habana Province.

Morales, Lomas de; hills in Habana Province.

Mordaza; village in municipal district of Cartagena, province of Santa Clara.

Mordazo; barrio in municipal district of Santo Domingo, province of Santa Clara.

Morena, Lomas de; hills in northern part of province of Santa Clara.

Morillo, Punta; point on north coast of municipal district of Puerto Padre, Santiago Province.

Moron; municipal district in province of Puerto Principe. Area 1,620 square miles. Population 9,630.

Moron; city near north coast in province of Puerto Principe. Population 2,084,

Moron; village in municipal district of Alto Songo, province of Santiago.

Moron; barrio in municipal district of Alto Songo, province of Santiago. Population 927.

Moron, Albufera y Laguna; marshy lake on north coast of province of Puerto Principe, municipal district of Moron.

Morrillo; village in municipal district of Consolacion del Norte, province of Pinar del Rio.

Mosas, Rio; small river in western part of province of Matanzas.

Mosquitos; village near north coast in municipal district of Guanajay, province of Pinar del Rio.

Mosquitos; barrio in municipal district of Mariel, province of Pinar del Rio.

Mosquitos, Rio; river flowing to north coast in province of Pinar del Rio.

Mostacilla; barrio in municipal district of Roque, province of Matanzas. Population 688.

Motembo; barrio in municipal district of Marti, province of Matanzas. Population 2,188.

Muerto, Arroyo de; small left-hand branch near head of Rio San Pedro in province of Puerto Principe.

Muerto, Arroyo del; short left-hand branch of Rio Cauto in municipal district of Mayari, province of Santiago.

Muerto, Estero de las; a creek on south coast of province of Puerto Principe.

Muertos, Cayos de los; small islands off south coast of province of Puerto Principe.

Muertos, Punta de los; point on coast of municipal district of Nuevitas, province of Puerto Principe.

Mula, Laguna de la; lake in municipal district of Santa Cruz del Sur, province of Santiago.

Mulas, Punta de; point on east coast of municipal district of Gibara, province of Santiago.

Mulas, Punta de; point on south coast of province of Santa Clara.

Mulata; barrio and village in municipal district of Bahia Honda, province of Pinar del Rio.

Mulata, Laguna; small lake in municipal district of Holguin, province of Santiago.

Mulato, Arroyo del; left-hand branch of Rio Caunao in municipal district of Puerto Principe, province of Puerto Principe.

Muletas, Loma de las; hills near north coast of Santiago Province, in municipal district of Gibara.

Municion, Arroyo; right-hand branch of Rio Bio, province of Santiago.

Muñoz, Arroyo; short coast stream in municipal district of Trinidad, province of Santa Clara.

Muñoz, Rio; river in province of Puerto Principe. Heads in western part of municipal district of Puerto Principe and flows southwestward to coast. Length 40 miles.

Naja, Loma de; hill in Habana Province.

Najasa, Rio; river in province of Puerto Principe. Heads in northeastern part of province and flows southwestward and southward to coast. Length 60 miles.

Najasa, Sierra de; mountains in southern part of municipal district of Puerto Principe, province of Puerto Principe.

Naranjo; barrio in municipal district of Consolacion del Sur, province of Pinar del Rio.

Naranjo, Ensenada; small bay on north coast of municipal district of Gibara, Santiago Province.

Naranjo, Arroyo; small left-hand branch of Rio Sevilla in municipal district of Puerto Principe, province of Puerto Principe.

Naranjo, Arroyo; short coast stream in municipal district of Cienfuegos, province of Santa Clara.

Naranjo, Loma de; hills in municipal district of Moron, province of Puerto Principe.

Naranjo, Rio; river in province of Santiago, flowing to north coast. Length about 23 miles.

Naranjo, Rio, right-hand branch of Rio Salado in Santiago Province, dividing municipal districts of Holguin and Puerto Padre for about 25 miles.

Naranjo, Rio; river flowing to south coast in province of Puerto Principe. Length 20 miles.

Naranjo, Rio; river in municipal district of Gibara, province of Santiago, flowing into Bahia de Banes.

Naranjo, Rio; left-hand branch of Toa River in Santiago Province.

Naraujal, Loma del; hills in municipal district of Santa Clara, province of Santa Clara.

Navajas; village in southern part of province of Matanzas.

Navarro, Rio; river flowing to west coast in province of Pinar del Rio.

Navas, Rio; short river in northern part of municipal district of Baracoa, province of Santiago.

Naza, Boca de; inlet on north coast of province of Pinar del Rio.

Nazareno; village in municipal district of Placetas, province of Santa Clara.

Nazareno; barrio and village in municipal district of Managua, province of Habana.

Nazareno; barrio in municipal district of Placetas, province of Santa Clara. Population 719.

Negra, Laga; small lake in western part of municipal district of Holguin, province of Santiago.

Negra, Punta; point on southeast coast of province of Santiago.

Negra, Santo de Punta; point on southeast coast of province of Santiago.

Negrillo, Estero del; inlet on south coast of province of Puerto Principe.

Negro, Cayo; islet off north coast of province of Santa Clara.

Negro, Rio; river in marshy region of province of Matanzas, tributary to Rio Hatiguanico.

Negros, Arroyo los. (See Guayacanes.)

Negros, Arroyo los; right-hand branch of Arroyo Menchaca in province of Puerto Principe.

Negros, Arroyo los; right-hand branch of Rio Guanajara in southern part of province of Santa Clara.

Negros, Lomas de los; hills in southern part of province of Santa Clara, municipal district of Santa Clara.

Negros, Punta los; point on south coast of province of Santa Clara.

Nibujon; village in northern part of Baracoa, province of Santiago.

Nibujon; barrio in municipal district of Baracoa, province of Santiago. Population 514.

Nibujon, Punta; point on north coast of municipal district of Baracoa, province of Santiago.

Nibujon, Rio; small river in northern part of Baracoa, province of Santiago.

Nigua, Arroyo; left-hand branch of Rio Naranjo, province of Santiago.

Nimanima; barrio in municipal district of Cobre, province of Santiago. Population 421.

Nipe, Bahia de; bay on north coast of province of Santiago.

Nipe, Rio; river in Santiago Province. Heads in western part of municipal district of Mayari and flows eastward and northward to coast. Length 15 miles.

Nipe, Sierra; mountains in municipal district of Mayari, province of Santiago.

Niquero (formed from Manzanillo); municipal district in province of Santiago. Area 145 square miles. Population 2,718.

Niquero; city near south coast of Santiago. Population 1,560.

Nombre de Dios; village near north coast in municipal district of Mantua, province of Pinar del Rio.

Nombre de Dios; barrio in municipal district of Guines, province of Habana.

Norte; barrio in municipal district of Alacranes, province of Matanzas. Population 1,267.

Norte; barrio in municipal district of Canasi, province of Matanzas. Population 1,624.

Nosa, Cayos de; group of small islands north of province of Santa Clara.

Novilla, Rio; small river in municipal district of Gibara, province of Santiago.

Novio, Lomas del; hills in Habana Province.

Nueva, Caleta; small bay on south coast of province of Santa Clara.

Nueva, Laguna; small lake in municipal district of Marti, province of Matanzas.

Nueva Gerona; village and barrio on north coast of Isla de Pinos.

Nueva Paz; municipal district in province of Habana. Area 151 square miles. Population 7,761.

Nueva Paz, an interior city of Habana. Population 2,294.

Nueva Paz; barrio in municipal district of Nueva Paz, province of Habana. Population 2,294.

Nuevas; village in municipal district of Esperanza, province of Santa Clara.

Nuevas; barrio in municipal district of Ciego de Avila, province of Puerto Principe. Population 957.

Nuevas; barrio in municipal district of Esperanza, province of Santa Clara. Population 1,309.

Nuevas; barrio in municipal district of Santa Isabel de las Lajas, province of Santa Clara. Population 265.

Nuevas, Rio de las; river flowing to north coast in Isla de Pinos. Length 17 miles.

Nuevas, Rio las; river flowing to south coast in municipal district of Moron, province of Puerto Principe.

Nuevas de Jobosi; barrio in municipal district of Ciego de Avila, province of Puerto Principe. Population 464.

Nuevas Grandes, Rio de; river 25 miles in length, rising in southern part of municipal district of Nuevitas, province of Puerto Principe, and flowing north into small bay of same name.

Nuevitas; municipal district in province of Puerto Principe. Area 1,034 square miles. Population 10,355.

Nuevitas; a coast city in province of Puerto Principe. Population 4,228.

Nuevitas, Arroyo de; stream flowing to north coast in municipal district of Nuevitas, province of Puerto Principe.

Nuevo Mayabeque, Rio; river in Habana Province flowing to south coast.

Obas, Laguna de las; lake in municipal district of Colon, province of Matanzas.

Obispo, Cayo; islet north of province of Pinar del Rio.

Obispo, Cayo del; islet off north coast of province of Santa Clara.

Obispo, Punta del; point on north coast of province of Santa Clara.

Ocampa, Cayo; island at mouth of Rio Caunao, south coast of province of Santa Clara.

Ochoa, Rio; left-hand branch of Rio Sagua la Chica in province of Santa Clara. Length 18 miles.

Ocujal; village in southern part of province of Santiago, near bay of Guantanamo.

Ocujal; barrio in municipal district of Guantanamo, province of Santiago. Population 90.

Ocujes, Punta; point on south coast of province of Santa Clara at mouth of Rio Tayabacoa.

Oeste; barrio in municipal district of Alacranes, province of Matanzas. Population 1,777.

Oeste; barrio in municipal district of Macagua, province of Matanzas. Population 1,029.

Ojo de Agua; village in municipal district of Cienfuegos, province of Santa Clara.

Ojo de Agua; town in western part of province of Santiago, municipal district of Puerto Padre.

Ojo de Agua; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 493.

Ojo de Agua; barrio in municipal district or Managua, province of Habana.

Ojo de Agua; barrio in municipal district of Puerto Padre, province of Santiago. Population 1,157.

Ojó de Agua, Arroyo; stream flowing to north coast in province of Santa Clara.

Ojo de Agua, Arroyo; stream flowing to west coast in municipal district of Niquero, Santiago Province.

Ojo de Agua, Loma; hills in Habana Province.

Ojo de Agua, Rio; left-hand branch ot Rio Contramaestra in municipal district of Jiguani, province of Santiago.

Ojo del Toro, Ensenada; small bay on south coast of municipal district of Niquero, province of Santiago.

Oliva, Lomas de; hills in Habana Province.

Organos, Sierra de los; range of mountains running through the province of Pinar del Rio, parallel to the coasts, with an average altitude of 2,000 feet and a maximum in Guajaybon of 2,500 feet.

Oriente; barrio in municipal district of Puerto Padre, province of Santiago. Population 2,471.

Orua, Punta; point on west coast of municipal district of Manzanillo, province of Santiago.

Oruita, Punta; point on west coast of municipal district of Manzanillo, Santiago Province.

Ovando, Cala de; cove and creek on east coast of province of Santiago.

Ovas; barrio in municipal district of Pinar del Rio, province of Pinar del Rio. Population 2,383.

Pabana, Paso; pass in Sierra del Jobo, province of Santiago.

Pablo; village in municipal district of Consolacion del Sur, province of Pinar del Rio.

Pablo; barrio in municipal district of Managua, province of Habana.

Pablo, Arroyo; stream in municipal district of Moron, province of Puerto Principe.

Padre, Lomas del; hills in Habana Province.

Padre, Punta; point on north coast of Puerto Padre, province of Santiago.

Padre, Punta del; point on south coast of province of Santa Clara.

Pajonal, Cayos del; group of small islands north of Cayos de la Tocinera, province of Santa Clara.

Palacios; barrio in municipal district of Julian Diaz, province of Pinar del Rio.

Palacios, Punta; point on south coast of municipal district of Niquero, Santiago Province.

Palacios, Rio los; outlet of Laguna Macuriges, flowing to south coast in province of Pinar del Rio.

Palenque; village in municipal district of Consolacion del Sur, province of Pinar del Rio.

Palenque; village in southern part of municipal district of Alto Songo, province of Santiago.

Palenque; barrio in municipal district of Alquizar, province of Habana. Population 1,933.

Palenque; barrio in municipal district of Alto Songo, province of Santiago. Population 1,900.

Palenque, El; hill in western part of province of Matanzas.

Palenquito; village in municipal district of Guantanamo, province of Santiago.

Palimino, barrio in municipal district of Ceiba del Agua, province of Habana.

Palizades; barrio in municipal district of San Luis, province of Pinar del Rio. Population 603.

Palizon, Arroyo el; stream flowing to south coast in municipal district of Puerto Principe, province of Puerto Principe.

Palizon, Cayo; islet south of province of Puerto Principe.

Palizon, Estero del; inlet on south coast of province of Puerto Principe.

Palizones, Laguna de; small lake near south coast of province of Santa Clara, in municipal district of Sancti Spiritus.

Palma; barrio in municipal district of Sabanilla, province of Matanzas.

Palma, Arroyo; left-hand branch of Rio Yaleras, province of Santiago.

Palma, Arroyo; small branch of Arroyo Ojo de Agua, in northern part of province of Santa Clara.

Palma, Arroyo; short left-hand branch of Rio Zaza, province of Santa Clara.

Palma, Arroyo la; stream in eastern part of municipal district of Ciego de Avila, province of Puerto Principe.

Palma, Cayo; islet off north coast of province of Puerto Principe.

Palma, Laguna la; lake near north coast in municipal district of Marti, province of Matanzas.

Palma, Rio de la; river in province of Matanzas, dividing it, for a distance of 10 miles from its source, from the province of Santa Clara. Length 33 miles.

Palma de San Juan; village in municipal district of Guantanamo, province of Santiago.

Palma de San Juan; barrio in municipal district of Guantanamo, province of Santiago. Population 231.

Palma Picada; barrio in municipal district of Ceiba del Agua, province of Habana.

Palmar; barrio in municipal district of Guantanamo, province of Santiago. Population 1,165.

Palmarito; village in northern part of municipal district of Puerto Padre, province of Santiago.

Palmarito; barrio in municipal district of Puerto Padre, province of Santiago. Population 1,072.

Palmarito, Arroyo; right-hand branch of Duaba River, in Santiago province.

Palmas Altas Caridad; town near coast in municipal district of Manzanillo, province of Santiago.

Palmas, Arroyo; stream in western part of municipal district of Puerto Padre, Santiago province.

Palma Sola; village in municipal district of Ceja de Pablo, province of Santa Clara.

Palma Sola; barrio in municipal district of Ceja de Pablo, province of Santa Clara. Population 201.

Palma Soriano; municipal district in province of Santiago. Area 244 square miles. Population 12,305.

Palma Soriano; an interior city and barrio in municipal district of Palma Soriano, province of Santiago. Population 1,776.

Palmillas; municipal district in province of Matanzas. Area 422 square miles. Population 7,647.

Palmillas; town in municipal district of Palmillas, province of Matanzas.

Palmillas; barrio in municipal district of Palmillas, province of Matanzas. Population 954.

Palmillas, Punta; point on south coast of province of Santa Clara.

Palmira; municipal district in province of Santa Clara. Area 132 square miles. Population 6,527.

Palmira; an interior city of Santa Clara. Population 4,519.

Palmitas, Arroyo; small stream in municipal district of Puerto Padre, province of Santiago.

Palmitas, Arroyo; small stream flowing to south coast in municipal district of Cobre, province of Santiago.

Palo, Faralon del; hills in eastern part of municipal district of Baracoa, province of Santiago.

Palos; barrio in municipal district of Nueva Paz, province of Habana. Population 2,630.

Palos, Arroyo dos; small branch of Rio Contramaestre in municipal district of Jiguani, Santiago Province.

Palo Seco, Loma; hill near south coast in municipal district of Trinidad, province of Santa Clara.

Panade Azucar; hill on northern slope of Sierra Maestra, province of Santiago.

Pan de Matanzas; hill in western part of province of Matanzas.

Papayal, Arroyo; left-hand branch of Rio San Pedro, province of Puerto Principe.

Parroquia; barrio in municipal district of Guantanamo, province of Santiago. Population 1,540.

Parroquia; barrio in municipal district of Santa Clara, province of Santa Clara. Population 3,349.

Paradas, Arroyo; right-hand branch of Yarey River, in municipal district of Puerto Padre, Santiago Province.

Paradero; barrio in municipal district of San Fernando, province of Santa Clara. Population 1,573.

Paradero; barrio in municipal district of San Nicolas, province of Habana.

Paredes; barrio in municipal district of Sancti Spiritus, province of Santa Clara. Population 578.

Paredes; village in municipal district of Sancti Spiritus, province of Santa Clara.

Pasage, Cayo; island north of province of Santa Clara.

Pasaje, Cayo del; islet north of province of Santa Clara.

Paso, Sierra de; mountains in western part of municipal district of Guantanamo, province of Santiago.

Pasobanco, Punta; point on south coast of Santa Clara, municipal district of Sancti Spiritus.

Paso Cabado; barrio in municipal district of Quemado de Guines, province of Santa Clara. Population 1,288.

Paso Presto, Punta; point on west coast of province of Santiago, municipal district of Bayamo.

Paso Real; village in municipal district of Calabazar, province of Santa Clara.

Paso Real; village in municipal district of Guane, province of Pinar del Rio.

Paso Real; barrio in municipal district of Calabazar, province of Santa Clara. Population 433.

Paso Real; barrio in municipal district of Guane, province of Pinar del Rio.

Pasos, Arroyo los; small stream in municipal district of Holguin, province of Santiago.

Paso Seco; barrio in municipal district of Matanzas, province of Matanzas.

Paso Viejo; village in municipal district of Pinar del Rio, province of Pinar del Rio.

Paso Viejo; barrio in municipal district of Pinar del Rio, province of Pinar del Rio. Population 2,351.

Pastora; barrio in municipal district of Santa Clara, province of Santa Clara. Population 3,171.

Patanca, Cayo; small island south of province of Santa Clara.

Paula; barrio in municipal district. of Sancti Spiritus, province of Santa Clara. Population 2,066.

Pavia, Punta la; point on north coast of province of Santa Clara.

Paz de los Naranjos; barrio in municipal district of Caney, province of Santiago. Population 284.

Pedernales, Punta; point on west coast of Isla de Pinos.

Pedregalon, Arroyo; small branch of Rio Cauto in municipal district of Holguin, Santiago Province.

Pedregosa, Lomas; hills in municipal district of Trinidad, province of Santa Clara.

Pedro Barba; barrio in municipal district of Sancti Spiritus, province of Santa Clara.

Pelada, Arroyo de la; small right-hand branch of Rio Zaza, province of Santa Clara.

Pelada, Loma la; hill in municipal district of Mantua, province of Pinar del Rio.

Peladas, Lomas; hills in municipal district of Sancti Spiritus, province of Santa Clara.

Pena Blanca; village in municipal district of Pinar del Rio, province of Pinar del Rio.

Pena Blanca, Loma; hill in municipal district of Pinar del Rio, province of Pinar del Rio.

Pena Brava; hill in municipal district of Manzanillo, province of Santiago.

Peñalver; village in Habana Province.

Pendejeras; village in northern part of province of Matanzas.

Pepe Antonio; barrio in municipal district of Guanabacoa, province of Habana.

Pequena, Sierra; mountains in northern part of Isla de Pinos.

Perdiz, Sierra de la; mountains in northern part of province of Pinar del Rio.

Pereguina, Lomas de; hills in Habana Province.

Pereira, Punta; point on north coast of Pinar del Rio.

Perejil, Rio; river in Habana Province, flowing to south-coast swamps.

Perico; municipal district in province of Matanzas. Area 44 square miles. Population 4,449.

Perico; an interior city of Matanzas. Population 2,436.

Perico, Norte; barrio in municipal district of Perico, province of Matanzas. Population 2,436.

Perico, Sur; barrio in municipal district of Perico, province of Matanzas. Population 324.

Perico, Viejo; village in municipal district of Perico, province of Matanzas.

Perpetua, Punta; point on south coast of San Antonio peninsula, province of Pinar del Rio.

Perrin, Arroyo; right-hand branch of Duaba River, in province of Santiago.

Perro, Estero del; inlet and creek on west coast of province of Puerto Principe.

Perro, Punta del; point on west coast of province of Puerto Principe.

Perros, Sierra de los; mountains on the north coast of province of Puerto Principe, in municipal district of Moron.

Peru; barrio in municipal district of Jaruco, province of Habana.

Pescadores, Punta; point on Cayo Sabinal, province of Puerto Principe.

Pesquera, Laguna; small lake in province of Puerto Principe, on boundary line between municipal districts of Ciego de Avila and Moron.

Pesquera Nueva, Punta; point on coast of municipal district of Gibara, province of Santiago.

Pesquero, Laguna del; lake near south coast of province of Puerto Principe and town of Guayabal.

Picado, Ensenada; small bay on west coast of province of Pinar del Rio.

Picapica, Laguna; small lake near south coast in municipal district of Los Palacios, province of Pinar del Rio.

Pichardo, Cayo; island north of province of Santa Clara.

Piedra, Laguna; lake in southern part of Isla de Pinos.

Piedra, Punta de; point on west coast of Isla de Pinos.

Piedra, Punta de; point on north coast of Isla de Pinos.

Piedra, Punta del; point on east coast of Isla de Pinos.

Piedras; village in municipal district of Las Vueltas, northern part of province of Santa Clara.

Piedras; village in municipal district of San Jose de los Ramos, province of Matanzas.

Piedras; *barrio* in municipal district of Bejucal, province of Habana. Population *670.*

Piedras; barrio in municipal district of Bolondron, province of Matanzas.

Piedras; barrio in municipal district of San Antonio de las Vueltas, province of Santa Clara. Population 1,204.

Piedras, Arroyo; left-hand branch of Rio de las Chambas, in northern part of provinces of Puerto Principe and Santa Clara.

Piedras, Arroyo Las; stream flowing to north coast, in municipal district of Neuvitas, province of Puerto Principe.

Piedras, Arroyo; small branch of Arroyo del Lindero, in province of Puerto Principe.

Piedras, Arroyo; left-hand branch of Rio Contramaestra, in municipal district of Jiguani, province of Santiago. Length 20 miles.

Piedras, Arroyo; short left-hand branch of Guantanamo River, in municipal district of Guantanamo, province of Santiago.

Piedras, Arroyo; creek flowing to coast, in western part of province of Pinar del Rio.

Piedras, Arroyo de; small left-hand branch of Rio Cuyaguateje, in western part of province of Pinar del Rio.

Piedras, Cayo; islet off north coast of province of Santa Clara.

Piedras, Cayo de; islet north of province of Matanzas.

Piedras, Rio; left-hand branch of Rio de la Palma, in province of Matanzas.

Piedras, Punta de; point on south coast of province of Santa Clara.

Piedras, Punta de; point on south coast of province of Pinar del Rio.

Piedras, Punta de; point on south coast of San Antonio peninsula, province of Pinar del Rio.

Piedrecilas, Laguna; small lake in municipal district of Cienfuegos, southern part of province of Santa Clara.

Pijuan; village in municipal district of San Jose de los Ramos, province of Matanzas.

Pila, Arroya de la; right branch of Muñoz River, in province of Puerto Principe.

Pilon, Cayos del; islets south of province of Puerto Principe.

Pilota, Punta; point on north coast of province of Puerto Principe.

Pilotos; barrio in municipal district of Consolacion del Sur, province of Pinar del Rio. Population 1,918.

Pimienta, Arroyo; short left-hand branch of Cauto River, in municipal district of Mayari, province of Santiago.

Pimiento, Laguna; small lake in municipal district of Guane, province of Pinar del Rio.

Pimpiniche, Punta; point on south coast of province of Puerto Principe.

Pinal, Cuchillas del; hills in municipal district of Sagua de Tanamo, province of Santiago.

Pinal Ciego, Punta; point on west coast of province of Pinar del Rio.

Pinal de Yaguas, Lomas; hills in municipal district of Guane, province of Pinar del Rio.

Pinar, Arroyo; right-hand branch of Duaba River in Santiago Province.

Pinar del Rio; the westernmost province of Cuba, comprising the entire breadth of the western portion of the island, with an area of 5,000 square miles. It is traversed by a mountain range, the Organ Mountains, running parallel to the coasts, a little north of the mid line between them. From the summit of this range the land slopes to the coast line on either side, and these slopes, especially the southern one, constitute the finest and richest tobacco lands of the island. The population of Pinar del Rio in 1899 was 173,064, the density of population being 35 to the square mile. The population is almost entirely rural. Males were in excess of females to the extent of 6 per cent. Native whites constituted 67 per cent, colored 27 per cent, and foreign-born 6 per cent of the inhabitants. It has the lowest literacy of all the provinces, persons able to read constituting only 19 per cent of the total population. The province is divided into 20 *municipal districts.*

Pinar del Rio; municipal district in province of Pinar del Rio. Area 361 square miles. Population 38,343.

Pinar del Rio; interior city and capital of the province of Pinar del Rio. Population 8,880.

Pinatillo, Punta del; point on west coast of province of Pinar del Rio.

Pinganillos, Punta; point on north coast of Habana Province.

Pinillos, Punta; point on west coast of province of Santiago, municipal district of Bayamo.

Pintado, Punta del; point on east coast of province of Santiago.

Piojo, Caleta; cove on south coast of San Antonio peninsula, province of Pinar del Rio.

Piojo, Ensenada; small bay on south coast of municipal district of Manzanillo, Santiago Province.

Pipian; municipal district in province of Habana. Area 66 square miles. Population 1,101.

Pipian; village in Habana Province.

Placetas; municipal district in province of Santa Clara. Area 226 square miles. Population 11,961.

Placetas; an interior city of Santa Clara Province. Population 5,409.

Placetas; barrio in municipal district of Placetas, province of Santa Clara.

Planazo, Punta del; point on south coast of province of Santa Clara.

Plata, Punta de la; point on north coast of province of Santiago.

Platanal; barrio in municipal district of Macuriges, province of Matanzas.

Platano; barrio in municipal district of Managua, province of Habana.

Platano, Arroyo; small right-hand branch of Rio San Pedro in municipal district of Puerto Principe, province of Puerto Principe.

Platano, Arroyo del; left-hand branch of Rio Caunao in municipal district of Puerto Principe, province of Puerto Principe.

Platano, Rio; left-hand branch of Rio Jaibo in municipal district of Sagua de Tanamo, province of Santiago.

Playa; barrio in municipal district of Marianao, province of Habana. Population 574.

Playa; barrio in municipal district of Mariel, province of Pinar del Rio.

Playa, Caleton de la; cove on south coast of province of Santiago.

Playa Bonita; barrio in municipal district of Santa Cruz del Sur, province of Puerto Principe.

Playa del Rincon; village in Habana Province.

Playa Larga, Punta; point on north coast of province of Santiago.

Playuelas; barrio in municipal district of Puerto Padre, province of Santiago. Population 1,038.

Playuelas, Rio; right-hand branch of Rio Naranjo in municipal district of Puerto Padre, Santiago Province.

Playuelas, Cayo las; islet off north coast of province of Pinar del Rio.

Plaza; barrio in municipal district of Jaruco, province of Habana.

Pociblos, Punta los; point on west coast of San Antonio peninsula, province of Pinar del Rio.

Pocitas, Arroyo de las; right-hand branch of Rio Calabazar in municipal district of Sancti Spiritus, province of Santa Clara.

Pocito; barrio in municipal district of Marianao, province of Habana. Population 1,560.

Ponce, Loma de; hill in Habana Province.

Pontezuela, Arroyo; right-hand branch of Rio Caunao, province of Puerto Principe.

Porro, Loma del; hill in northern part of municipal district of Nuevitas, province of Santiago.

Portales; village on river of same name in municipal district of Guane, province of Pinar del Rio.

Portales; barrio in municipal district of Guane, province of Pinar del Rio.

Portales, Rio los; left-hand branch of Rio Cuyaguateje in western part of province of Pinar del Rio.

Portillo; town at mouth of river of same name on south coast of province of Santiago.

Portillo; barrio in municipal district of Manzanillo, province of Santiago. Population, 440.

Portillo, Cayo; islet north of province of Matanzas.

Portillo, Puerto; port on south coast of municipal district of Manzanillo, province of Santiago.

Portillo, Punta, Ensenada, and Rio; point, small harbor, and river on south coast of province of Santiago, in municipal district of Cobre.

Portillo, Punta; point on south coast of Manzanillo, province of Santiago.

Portillo, Rio; river flowing to south coast in Santiago Province.

Portillo, Sierra del; mountains in southern part of municipal district of Puerto Principe, province of Puerto Principe.

Portier, Rio; a river of Habana Province, flowing to north coast.

Potosi, Laguna; small lake in western part of municipal district of Puerto Padre, province of Santiago.

Potrenillo, Boca del; small bay on west coast of province of Puerto Principe.

Potrerillo; village in municipal district of Gibara, province of Santiago.

Potrerillo; village in municipal district of San Juan de las Yeras, province of Santa Clara.

Potrerillo; barrio in municipal district of Gibara, province of Santiago. Population 920.

Potrerillo; barrio in municipal district of San Juan de las Yeras, province of Santa Clara. Population 741.

Potrerillo; barrio and village in municipal district of Santo Domingo, province of Santa Clara.

Potrerillo, Pico; mountain peak in southern part of province of Santa Clara, municipal district of Trinidad.

Potrero, Punta del; point on east coast of Isla de Pinos.

Poveda; barrio in municipal district of Bejucal, province of Habana.

Poveda, Laguna; small lake in municipal district of San Luis, southern part of province of Pinar del Rio.

Pozas, Rio; river flowing to north coast in province of Pinar del Rio.

Pozo de la China; barrio in municipal district of Ranchuelo, province of Santa Clara. Population 1,101.

Practicos, Punta; point on north coast of Puerto Principe Province.

Primero de Martinez; barrio in municipal district of San Juan y Martinez, province of Pinar del Rio.

Providencia, Cayo; islet south of Zapata peninsula, province of Santa Clara.

Provincial; barrio in municipal district of Santa Clara, province of Santa Clara. Population 1,195.

Pueblo Nuevo; village in municipal district of Candelaria, province of Pinar del Rio.

Pueblo Nuevo; town in province of Puerto Principe, near city of Puerto Principe.

Pueblo Nuevo; barrio in municipal district of Cardenas, province of Matanzas.

Pueblo Nuevo; barrio in municipal district of Cruces, province of Santa Clara. Population 818.

Pueblo Nuevo; barrio in municipal district of Gibara, province of Santiago. Population 826.

Pueblo Nuevo; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 1,655.

Pueblo Nuevo; barrio in municipal district of San Jose de los Ramos, province of Matanzas. Population 1,487.

Pueblo Nuevo; barrio in municipal district of Sancti Spiritus, province of Santa Clara.

Pueblo Nuevo; barrio in municipal district of Union de Reyes, province of Matanzas. Population 545.

Puente; barrio in municipal district of Jaruco, province of Habana.

Puente; barrio in municipal district of Santa Clara, province of Santa Clara. Population 2,594.

Puentes Grandes; city in province of Habana. Population 2,683.

Puentes Grandes; barrio in municipal district of Habana, province of Habana. Population 3,262.

Puercas, Ensenada Las; small bay on south coast of municipal district of Manzanillo, Santiago Province.

Puercos, Arroyo Los; left-hand branch of Rio de Guayabano in municipal district of Guantanamo, province of Santiago.

Puercos, Punta de Los; point on northeast coast of province of Santiago.

Puercos, Rio; river flowing to north coast in western part of province of Pinar del Rio.

Puerta, Punta de la; point on south coast of province of Santiago.

Puerta de la Guira; barrio in municipal district of Artemisa, province of Pinar del Rio. Population 498.

Puertala Guira; village in municipal district of Artemisa, province of Pinar del Rio.

Puerto Escondido; barrio in municipal district of Santo Domingo, province of Santa Clara. Population 741.

Puerto Padre; municipal district in province of Santiago. Area 1,215 square miles. Population 19,984.

Puerto Padre; a coast city in province of Santiago. Population 1,729.

Puerto Principe; a province of Cuba, situated toward the eastern part of the island, with an area of 10,500 square miles. The surface is rolling and toward the eastern part becomes hilly and broken. Much of it is composed of great plains or savannas, which are devoted to pasturage. The population was in 1899 88,234, being the smallest of the six provinces. The density of the population was only 8 to the square mile. Of the total population 28 per cent lived in towns of 8,000 inhabitants or more. Males were in excess of females to the extent of 2 per cent. As to race and nativity, three-fourths of the population were native whites, 5 per cent were foreign born, and 20 per cent were colored, the proportion of colored being smaller than in any other province. Of the total population 38 per cent were able to read, the percentage being greater than in any other province, with the exception of Habana. The province is divided into five municipal districts. Its capital is Puerto Principe.

Puerto Principe; municipal district in province of Puerto Principe. Area 4,630 square miles. Population 53,140.

Puerto Principe; an interior city and capital of province of Puerto Principe. Population 25,102.

Puerto Rico; barrio in municipal district of Candelaria, province of Pinar del Rio.

Puerto Rico, Arroyo; right-hand branch of Rio Cabreras, Santiago Province.

Puerto Rico, Punta del; point on east coast of municipal district of Gibara, province of Santiago.

Punta; barrio in municipal district of Bolondron, province of Matanzas.

Punta, Loma; hill in municipal district of Jiguani, in Santiago Province.

Punta, Lomas de Oro; hills in southern part of municipal district of Bayamo, Santiago Province.

Punta Alegre; barrio in municipal district of Moron, province of Puerto Principe. Population 495.

Punta Brava; village in Habana Province.

Punta Brava; barrio in municipal district of Bauta, province of Habana.

Punta Brava; barrio in municipal district of Macuriges, province of Matanzas. Population 1,508.

Punta de la Sierra; barrio in municipal district of Guane, province of Pinar del Rio.

Punta de Palmas; village in municipal district of Consolacion del Sur, province of Pinar del Rio.

Punta de Practicos; barrio in municipal district of Niquero, province of Santiago.

Purgatorio, Caleta del; cove on south coast of Isla de Pinos.

Purgatorio, Punta; point on west coast of municipal district of Niquero, Santiago province.

Purgatorio, Punta; point on north coast of province of Pinar del Rio.

Purial; village in municipal district of Guantanamo, province of Santiago.

Purial; barrio in municipal district of Esperanza, province of Santa Clara. Population 915.

Purial, Arroyo; right-hand branch of Jauco River in Santiago Province.

Purnio; village in municipal district of Holguin, province of Santiago.

Purnio; barrio in municipal district of Holguin, province of Santiago. Population 980.

Puto, Cayo; islet south of Cayo Romano.

Quebra Hacha; village in municipal district of Guanajay, northern part of province of Pinar del Rio.

Quemada Pinales; foothills of the Sierra Maestra, in Santiago province.

Quemado; town in municipal district of Santa Cruz del Sur, southern part of province of Puerto Principe.

Quemado; barrio in municipal district of Baracoa, province of Santiago. Population 363.

Quemado; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 805.

Quemado, Alto del; hills in municipal district of Mayari, province of Santiago.

Quemado, Loma; hills in municipal district of Guantanamo, province of Santiago.

Quemado, Punta del; point on east coast of province of Santiago.

Quemado de Guines; municipal district in province of Santa Clara. Area 167 square miles. Population 8,890.

Quemado de Guines; an interior city in province of Santa Clara. Population 1,562.

Quemado de Guines; barrio in municipal district of Quemado de Guines, province of Santa Clara. Population 3,082.

Quemado de Pinedo, Rio; left-hand branch of Rio Cuyaguateje, in western part of province of Pinar del Rio.

Quemado Grande, Arroyo; small right-hand branch of Rio Jobabo, in province of Puerto Principe.

Quemado Hilario; barrio in municipal district of San Juan de las Yeras, province of Santa Clara. Population 503.

Quemados; barrio in municipal district of Marianao, province of Habana. Population 3,177.

Quesigua, Rio; stream in northern part of municipal district of Baracoa, province of Santiago.

Quibican Rio; river in Habana Province, flowing to north coast.

Quibican, Surgidero; anchorage on south coast of province of Santiago, municipal district of Cobre.
Quibijan, Rio; right-hand branch of Barba River in Santiago Province.
Quiebra Hacha; barrio in municipal district of Mariel, province of Pinar del Rio.
Quimbambas, Lomas de las; hills in central part of province of Matanzas.
Quinta; barrio in municipal district of San Antonio de las Vueltas, province of Santa Clara. Population 1,422.
Quintana; village in municipal district of Guanajay, northern part of province of Pinar del Rio.
Quintana; village in municipal district of Roque, province of Matanzas.
Quintana; barrio in municipal district of Guayabal, province of Pinar del Rio. Population 562.
Quintana; barrio in municipal district of Roque, province of Matanzas.
Quintana; barrio in municipal district of San Antonio de los Baños, province of Habana. Population 705.
Quintinal; barrio in municipal district of Batabano, province of Habana.
Quitasol, Cayo; islet south of province of Santa Clara.
Quivican; municipal district in province of Habana. Area 65 square miles. Population 2,423.
Quivican; an interior city in province of Habana. Population 1800.
Quivican, Loma; hill in southern part of province of Santa Clara, municipal district of Cienfuegos.
Quivican, Rio de; river in Habana province, flowing to south coast.
Raisu, Arroyo; short left-hand branch of Toa River in Santiago Province.
Ramirez; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 680.
Ramon de las Yaguas; barrio in municipal district of Santiago de Cuba, province of Santiago. Population 2,388.
Ramos; village in municipal district of Alto Songo, province of Santiago.
Ramos; barrio in municipal district of Managua, province of Habana.
Ramos, Arroyo; stream in western part of municipal district of Puerto Padre, Santiago Province.
Rancho Boyero; village in Habana Province.
Rancho del Medio; village in northern part of province of Matanzas.
Rancho del Medio; barrio in municipal district of Maximo Gomez, province of Matanzas. Population 701.
Rancho Quemado, Punta de; point on west coast of Isla de Pinos.
Rancho Simon, Arroyo; branch of Rio Almendares, in Habana Province.
Rancho Veloz; municipal district in province of Santa Clara. Area 161 square miles. Population 7,532.
Rancho Veloz; a coast city in province of Santa Clara. Population 1,514.
Rancho Viejo, Lomas de; hills in Habana Province.
Rancho Viejo, Punta de; point on east coast of Isla de Pinos.
Ranchuelo; municipal district in province of Santa Clara. Area 40 square miles. Population 5,059.
Ranchuelo; an interior city in province of Santa Clara. Population 3,019.
Rangel, Sierra del; mountains in northern part of province of Pinar del Rio.
Rapado, Cayo; island west of province of Pinar del Rio.
Rapays, Laguna; small lake in southern part of province of Puerto Principe, municipal district of Santa Cruz del Sur.
Raspadura, Arroyo de la; small left-hand branch of Rio Toa in Santiago Province.
Rastro; barrio in municipal district of Guantanamo, province of Santiago. Population 831.
Ratones, Cayo; islet off north coast of Pinar del Rio.

Batones, Cayo; islet off north coast of province of Santa Clara.

Bayo; barrio in municipal district of Mariel, province of Pinar del Rio.

Real, Ensenada el; small bay on south coast of municipal district of Niquero, Santiago Province.

Realengo; barrio in municipal district of Jovellanos, province of Matanzas. Population 363.

Recrea; village in northern part of province of Matanzas.

Redencion; barrio in municipal district of Nuevitas, province of Puerto Principe. Population 830.

Redonda, Caleta; cove on south coast of municipal district of Cienfuegos, province of Santa Clara.

Redonda, Laguna; small lake on south coast of province of Santa Clara, in municipal district of Sancti Spiritus.

Redonda, Laguna; lake in municipal district of Guane, southern part of province of Pinar del Rio.

Regidor, Loma del; hills in southern part of municipal district of Santa Clara, province of Santa Clara.

Regla; municipal district and city on Habana Harbor, opposite city of Habana, province of Habana. Population 11,363.

Regla, Arroyo; branch of Arroyo Zacatecas in northern part of province of Santa Clara.

Reloj; barrio in municipal district of Aguacate, province of Habana.

Reloj; barrio in municipal district of Bainoa, province of Habana.

Remanganaguas; village in municipal district of Palma Soriano, province of Santiago.

Remanganaguas; barrio in municipal district of Palma Soriano, province of Santiago. Population 1,688.

Remate; barrio and village in municipal district of San Juan de los Remedios, province of Santa Clara.

Remate, Estero del; inlet on west coast of province of Puerto Principe.

Remate, Rio del; left-hand branch of Rio Zaza, in northern part of province of Santa Clara.

Remates; village in municipal district of Guane, southern part of province of Pinar del Rio.

Remates; barrio in municipal district of Guane, province of Pinar del Rio. Population 3,014.

Remedios; city near north coast in province of Santa Clara. Population 6,633.

Resbalosa, Laguna; lake near south coast of province of Puerto Principe, in municipal district of Santa Cruz del Sur.

Retiro, Sierra del; mountains in municipal district of Mantua, western part of province of Pinar del Rio.

Ricaco, Punta del; point on east coast of province of Santiago.

Rico, Arroyo; short branch of Rio Contramaestra in municipal district of Cobre, province of Santiago.

Riecito, Arroyo; right-hand branch of Rio Tana, in province of Puerto Principe.

Rincon; village in Habana Province.

Rincon; barrio in municipal district of Santiago de las Vegas, province of Habana.

Rincon, Caleta del; cove on south coast of municipal district of Niquero, Santiago Province.

Rinconada; village in municipal district of Jiguani, province of Santiago.

Rinconada; barrio in municipal district of Jiguani, province of Santiago. Population 1,012.

Rincon de la Palma; village in municipal district of Holguin, Santiago Province.

Rincon de Sevilla, Surgidero del; anchorage on south coast of municipal district of Cobre, province of Santiago.

Rincon Grande, Punta de; point on north coast of municipal district of Puerto Principe, province of Puerto Principe.

Rio; barrio in municipal district of Santo Domingo, province of Santa Clara.

Rio Abajo, Arroyo; left branch of Rio Caunao in municipal district of Puerto Principe, province of Puerto Principe.

Rio Blanco; village near coast in municipal district of Consolacion del Norte, province of Pinar del Rio.

Rio Blanco; barrio in municipal district of Consolacion del Norte, province of Pinar del Rio.

Rio Blanco; barrio in municipal district of Macuriges, province of Matanzas. Population 1,577.

Rio de Ay; village on river of same name in municipal district of Trinidad, province of Santa Clara.

Rio de Ay; barrio in municipal district of Trinidad, province of Santa Clara. Population 2,417.

Rio de Puercos; barrio in municipal district of Consolacion del Norte, province of Pinar del Rio.

Rio Feo; village in municipal district of Pinar del Rio, province of Pinar del Rio.

Rio Feo; barrio in municipal district of Pinar del Rio, province of Pinar del Rio. Population 1,034.

Rio Frio; barrio in municipal district of Cobre, province of Santiago. Population 605.

Rio Hondo; barrio and village in municipal district of Candelaria, province of Pinar del Rio.

Rio Hondo; barrio and village in municipal district of Consolacion del Sur, province of Pinar del Rio.

Rio Hondo; barrio and village in municipal district of San Cristobal, province of Pinar del Rio.

Rioja, Rio la; right-hand branch of Rio Salado, in municipal district of Holguin, Santiago Province.

Rio Seco; village in municipal district of Guantanamo, province of Santiago.

Rio Seco; village in municipal district of San Luis, province of Pinar del Rio.

Rio Seco; barrio in municipal district of Guantanamo, province of Santiago. Population 1,334.

Rio Seco; barrio in municipal district of San Luis, province of Pinar del Rio. Population 760.

Rio Seco; barrio in municipal district of San Juan y Martinez, province of Pinar del Rio. Population 1,920.

Rio Seco, Punta; point on south coast of province of Santiago.

Rio Seco, Surgidero; anchorage on south coast of province of Santiago.

Rio Sequito; village in municipal district of Pinar del Rio, province of Pinar del Rio.

Rio Sequito; barrio in municipal district of Pinar del Rio, province of Pinar del Rio. Population 4,278.

Rios, Surgidero de Dos; anchorage on coast of municipal district of Cobre, southern part of province of Santiago.

Roblar; village in municipal district of Consolacion del Sur, province of Pinar del Rio.

Roblar, Rio; river flowing to south coast in province of Pinar del Rio.

Roble, Arroyo; short left-hand branch of Rio de las Caravelas in province of Puerto Principe.

Robles; *village* in municipal district of Cardenas, northern part of province of *Matanzas.*

Robles, Arroyo; stream in province of Puerto Principe, flowing to north coast.

Rodas; municipal district in province of Santa Clara. Area 153 square miles. Population 9,562.

Rodas; an interior city in province of Santa Clara. Population 3,390.

Rodrigo; village in municipal district of Santo Domingo, province of Santa Clara.

Rodrigo; barrio in municipal district of Santo Domingo, province of Santa Clara. Population 583.

Romano, Cayo; large island north of municipal district of Puerto Principe, province of Puerto Principe.

Romero, Cayo; islet north of province of Matanzas.

Rompe, Lomas de; hills in western part of municipal district of Puerto Padre, province of Santiago.

Roque; municipal district in province of Matanzas. Area 126 square miles. Population 4,464.

Roque; barrio and city in municipal district of Roque, province of Matanzas. Population 1,482.

Roques, Punta de los; point on north coast of Habana Province.

Rosa, Loma de la; hill in southern part of province of Santa Clara, municipal district of Sancti Spiritus.

Rosario; barrio in municipal district of Viñales, province of Pinar del Rio. Population 2,061.

Rosario, Caleta; small bay on south coast of province of Santa Clara.

Rosario, Rio; right-hand branch of Rio Santo Domingo, in province of Matanzas.

Rosario, Rio del; river flowing to north coast in western part of province of Pinar del Rio.

Rosita, Punta; point on north coast of province of Santiago.

Rubio; barrio in municipal district of Guines, province of Habana.

Ruta, Rio; small river on north coast of municipal district of Sagua de Tanamo, province of Santiago.

Ruvira; barrio in municipal district of Jaguey Grande, province of Matanzas. Population 827.

Sabalo; village and barrio in municipal district of Guane, province of Pinar del Rio.

Sabana; village in northeastern part of municipal district of Baracoa, province of Santiago.

Sabana; barrio in municipal district of Baracoa, province of Santiago. Population 654.

Sabana; barrio in municipal district of Camajuani, province of Santa Clara. Population 1,621.

Sabana de Robles; barrio in municipal district of Madruga, province of Habana.

Sabana Grande; village in municipal district of Ceja de Pablo, province of Santa Clara.

Sabana Grande; barrio in municipal district of Ceja de Pablo, province of Santa Clara. Population 1,190.

Sabanalamar, Estero and Laguna; inlet and small lake on south coast of province of Puerto Principe.

Sabanalamar, Rio; river dividing municipal districts of Baracoa and Guantanamo, province of Santiago, for 22 miles from southern coast.

Sabanalamar, Punta; point on south coast of province of Santiago.

Sabana Nueva, Laguna; small lake in northern part of province of Puerto Principe, municipal district of Puerto Principe.

Sabana Robles; village in Habana Province.

Sabanas Nuevas, Lomas de; hills in northern part of province of Santa Clara.

Sabaneton, Punta; point on north coast of Habana Province.

Sabanilla; municipal district in province of Matanzas. Area 77 square miles. Population 5,205.

Sabanilla; an interior city in province of Matanzas. Population 2,200.

Sabanilla; village in municipal district of Alto Songo, province of Santiago.

Sabanilla; barrio in municipal district of Baracoa, province of Santiago. Population 780.

Sabanilla; barrio in municipal district of Maximo Gomez, province of Matanzas. Population 277.

Sabanilla; barrio in municipal district of Mayari, province of Santiago. Population 177.

Sabanilla; barrio in municipal district of Sabanilla, province of Matanzas. Population 3,781.

Sabanilla, Punta; point on south coast of province of Santa Clara.

Sabanilla, Rio; left-hand branch of Guantanamo River in province of Santiago.

Sabanilla, Rio; river in northern part of municipal district of Baracoa, province of Santiago.

Sabicu, Loma del; hill in municipal district of Pinar del Rio, province of Pinar del Rio.

Sabinal; barrio in municipal district of Nuevitas, province of Puerto Principe. Population 107.

Sabinal, Cayo; large island north of municipal district of Nuevitas, province of Puerto Principe.

Sabinal, Punta; point on Cayo Sabinal, province of Puerto Principe.

Sacramento, Lomas del; hills in Habana Province.

Sagra, Cayo la; islet north of province of Santa Clara.

Sagua; village in municipal district of Consolacion del Sur, province of Pinar del Rio.

Sagua, Rio; river in municipal district of Sagua de Tanamo, province of Santiago, flowing to north coast.

Sagua de Tanamo; municipal district in province of Santiago. Area 628 square miles. Population 5,796.

Sagua de Tanamo; city near north coast in province of Santiago, on Rio Sagua. Population 1,252.

Sagua de Tanamo, Surgidero; anchorage on north coast of municipal district of Sagua de Tanamo, province of Santiago.

Sagua la Chica; barrio in municipal district of San Antonio de las Vueltas, province of Santa Clara.

Sagua la Chica, Rio; river in province of Santa Clara. Heads in hills in municipal district of Placetas and flows north to sea. Length 45 miles.

Sagua la Grande; municipal district in province of Santa Clara. Area 205 square miles. Population 21,342.

Sagua la Grande; city situated near coast, on river of same name, in province of Santa Clara. Population 12,728.

Sagua la Grande, Rio; important river in province of Santa Clara. Heads in Sierra de Escambray and flows to north coast. Length 73 miles.

Sal, Cayos de la; group of small islands south of province of Santa Clara.

Salado; barrio in municipal district of Santa Isabel de las Lajas, province of Santa Clara.

Salado, Arroyo; right-hand branch of Bio River in Mayari municipal district, province of Santiago.

Salado, Arroyo; right branch of Arroyo las Lagunas in municipal district of Puerto Padre, province of Santiago.

Salado, Arroyo; small stream in western part of municipal district of Ciego de Avila, province of Puerto Principe.

Salado, Arroyo; right-hand branch of Rio Zaza, in southern part of province of Santa Clara.

Salado, Arroyo; stream in municipal district of Manzanillo, province of Santiago.

Salado, Rio; river flowing into Cienfuegos Bay on south coast of province of Santa Clara.

Salado, Rio; river flowing to west coast in province of Pinar del Rio.

Salado, Rio; an important tributary to the Cauto River, in northern part of Santiago Province. Length 35 miles.

Salamanca; village in municipal district of Camajuani, province of Santa Clara.

Salamanca; barrio in municipal district of Camajuani, province of Santa Clara. Population 1,704.

Sales; village near north coast in province of Matanzas.

Salina, Laguna; lake in San Antonio peninsula, western part of province of Pinar del Rio.

Salinas, Cayo de; island off north coast of province of Santa Clara.

Salinas, Loma; hill on north coast of municipal district of Puerto Padre, province of Santiago.

Salinas, Punta; point on south coast of province of Pinar del Rio.

Salinas, Puntas; points on north coast of Isla de Pinos.

Salinas, Punta de; point on north coast of province of Puerto Principe.

Saltadero, Arroyo; creek in northern part of municipal district of Sagua de Tanamo, province of Santiago.

Salto; village in municipal district of Santa Isabel de las Lajas, province of Santa Clara.

Salto; barrio in municipal district of Santa Isabel de las Lajas, province of Santa Clara. Population 1,199.

Salud; municipal district in province of Habana. Area 43 square miles. Population 3,293.

Sama; village on north coast of Santiago Province, municipal district of Gibara.

Sama; barrio in municipal district of Gibara, province of Santiago. Population 1,606.

Sama, Punta; point on coast of municipal district of Gibara, province of Santiago.

Sama, Rio; small river and harbor on north coast of province of Santiago, municipal district of Gibara.

Samaraguacon, Rio; river in province of Puerto Principe flowing northeast to coast. Length 45 miles.

Sanabria, Huevas de; hills in Habana Province.

Sanama, Punta; point on north coast of province of Santiago.

San Andres; village in municipal district of Holguin, province of Santiago.

San Andres; village in municipal district of Sabanilla, province of Matanzas.

San Andres; barrio in municipal district of Alquizar, province of Habana. Population 293.

San Andres; barrio in municipal district of Consolacion del Norte, province of Pinar del Rio. Population 671.

San Andres; barrio in municipal district of Holguin, province of Santiago. Population 1,181.

San Andres; barrio in municipal district of Placetas, province of Santa Clara.

San Andres; barrio in municipal district of Sancti Spiritus, province of Santa Clara.

San Andres; barrio in municipal district of Tapaste, province of Habana.

San Andres, Lomas de; hills in Habana Province.

San Anton, Rio; river flowing to north coast in province of Matanzas.

San Anton, Rio; left-hand branch of Rio Yaleras, municipal district of Guantanamo, province of Santiago. Length 15 miles.

San Anton de la Anegada; village in northern part of province of Ma[illegible]

San Antonio; village in municipal district of Guantanamo, province of Santiago.

San Antonio; barrio in municipal district of Santa Maria del Rosario, province of Habana.

San Antonio, Arroyo; stream flowing to north coast in municipal district of Nuevitas, province of Puerto Principe.

San Antonio, Cabo; cape at western extremity of San Antonio Peninsula, province of Pinar del Rio.

San Antonio, Peninsula; western extension of province of Pinar del Rio.

San Antonio, Rio; river in Habana Province, flowing to south coast.

San Antonio de las Vegas; municipal district in province of Habana. Area 42 square miles. Population 1,855.

San Antonio de las Vegas; village in Habana Province.

San Antonio de las Vueltas; municipal district in province of Santa Clara. Area 208 square miles. Population 12,832.

San Antonio de las Vueltas; barrio in municipal district of San Antonio de las Vueltas, province of Santa Clara. Population 1,336.

San Antonio de los Baños; municipal district in province of Habana. Area 30 square miles. Population 12,631.

San Antonio de los Baños; an interior city in province of Habana. Population 8,178.

San Antonio de Rio Blanco; village in Habana Province.

San Antonio de Rio Blanco del Norte; barrio in municipal district of Santa Cruz del Norte, province of Habana. Population 965.

San Augustin; town in western part of municipal district of Holguin, province of Santiago.

San Augustin; barrio in municipal district of Batabano, province of Habana.

San Augustin; barrio in municipal district of Holguin, province of Santiago. Population 2,163.

San Augustin, Arroyo; left-hand branch of Rio Caunao, in municipal district of Puerto Principe, province of Puerto Principe.

San Augustin, Arroyo; right-hand branch of Rio Cabreras, in municipal district of Puerto Padre, Santiago Province.

San Bartolome; village and barrio in municipal district of Santo Domingo, province of Santa Clara.

San Bartolome; village in municipal district of Jiguani, Santiago Province.

San Blas; village in municipal district of San Diego de Nuñez, province of Pinar del Rio.

San Blas; barrio in municipal district of Madruga, province of Habana.

San Blas, Laguna; lake in municipal district of Marti, province of Matanzas.

San Cayetano; village in municipal district of Viñales, province of Pinar del Rio.

San Cayetano; barrio in municipal district of Viñales, province of Pinar del Rio. Population 2,920.

San Cristobal; municipal district in province of Pinar del Rio. Area 235 square miles. Population 4,263.

San Cristobal; town in municipal district of same name in province of Pinar del Rio.

San Cristobal; barrio in municipal district of San Cristobal, province of Pinar del Rio. Population 1,996.

San Diego, Rio; river in northern part of province of Pinar del Rio, flowing into Bahia Honda.

San Diego de los Baños; municipal district in province of Pinar del Rio. Area 202 square miles. Population 2,419.

San Diego de los Baños; village in municipal district of same name in province of Pinar del Rio.

San Diego del Valle; municipal district in province of Santa Clara. Area 95 square miles. Population 5,369.

San Diego de Nuñez; municipal district in province of Pinar del Rio. Area 138 square miles. Population 1,137.

San Diego de Nuñez; village in municipal district of same name in province of Pinar del Rio.

San Felipe; municipal district in province of Habana. Area 18 square miles. Population 1,915.

San Felipe; city in province of Habana. Population 1,450.

San Felipe, Loma de; hills in northern part of municipal district of Puerto Principe, province of Puerto Principe.

San Felipe, Rio; river in province of Pinar del Rio. Heads in Sierra de los Organos and flows to south coast in municipal district of Consolacion del Sur. Length 35 miles.

San Felipe, Rio; river flowing to south coast in province of Pinar del Rio, through municipal districts of Pinar del Rio and San Luis.

San Felipe, Rio; branch of Quivican River in Habana Province.

San Fernando; municipal district in province of Santa Clara. Area 67 square miles. Population 6,445.

San Fernando; an interior city in province of Santa Clara. Population 1,078.

San Fernando; village in municipal district of Holguin, Santiago Province.

San Fernando, Laguna; lake in municipal district of Guane, southern part of province of Pinar del Rio.

San Francisco; village in municipal district of Consolacion del Sur, province of Pinar del Rio.

San Francisco; village in municipal district of Trinidad, province of Santa Clara.

San Francisco; barrio in municipal district of Guanajay, province of Pinar del Rio. Population 626.

San Francisco; barrio in municipal district of Matanzas, province of Matanzas. Population 234.

San Francisco; barrio in municipal district of Trinidad, province of Santa Clara. Population 546.

San Francisco, Arroyo; small branch of Rio Jaruco, in Habana Province

San Francisco de Paula; village in Habana Province.

San Francisco de Paula; village in municipal district of Matanzas, province of Matanzas.

San Gabriel; village near south coast, in municipal district of Julian Diaz, province of Pinar del Rio.

San Geronimo; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 986.

San Gil; village in municipal district of Santa Clara, province of Santa Clara.

San Gil; barrio in municipal district of Santa Clara, province of Santa Clara. Population 3,411.

San Gregorio; barrio in municipal district of Mayari, province of Santiago. Population 1,821.

San Jose; village in municipal district of Pinar del Rio, province of Pinar del Rio.

San Jose; barrio in municipal district of Esperanza, province of Santa Clara. Population 976.

San Jose; barrio in municipal district of Guanajay, province of Pinar del Rio. Population 389.

San Jose; barrio in municipal district of Jovellanos, province of Matanzas. Population, 2,018.

San Jose; barrio in municipal district of Mantua, province of Pinar del Rio.

San Jose; barrio in municipal district of Pinar del Rio, province of Pinar del Rio. Population 2,512.

San Jose, Arroyo; stream in northern part of municipal district of Nuevitas, province of Puerto Principe.

San Jose, Rio; tributary to Quivican River, in Habana Province.

San Jose, Sierra de; mountains in western part of Isla de Pinos.

San Jose de las Lajas; municipal district in province of Habana. Area 56 square miles. Population 4,154.

San Jose de las Lajas; an interior city of Habana. Population 3,024.

San Jose de los Ramos; municipal district in province of Matanzas. Area 146 square miles. Population 6,765.

San Jose de los Ramos; an interior city of Matanzas. Population 2,310.

San Juan; barrio in municipal district of Bayamo, province of Santiago. Population 1,234.

San Juan; barrio in municipal district of Sagua la Grande, province of Santa Clara. Population 769.

San Juan; barrio in municipal district of San Juan de las Yeras, province of Santa Clara. Population 2,401.

San Juan; barrio in municipal district of Santo Domingo, province of Santa Clara. Population 521.

San Juan, Cerros de; hills in eastern part of Isla de Pinos.

San Juan, Punta de; point on north coast of province of Puerto Principe.

San Juan, Punta de; point on south coast of province of Puerto Principe.

San Juan, Punta de; point on Peninsula de la Torre, north coast of province of Santiago.

San Juan, Rio; tributary to Quivican River, in Habana Province.

San Juan, Rio; river flowing to south coast of province of Santa Clara.

San Juan, Rio; river flowing to north coast, in province of Matanzas.

San Juan Bautista; village in northern part of province of Pinar del Rio.

San Juan Bautista; barrio in municipal district of Mariel, province of Pinar del Rio.

San Juan de Barracones; barrio in municipal district of Candelaria, province of Pinar del Rio.

San Juan de Dios; barrio in municipal district of Santa Cruz del Norte, province of Habana.

San Juan de las Yeras; municipal district in province of Santa Clara. Area 115 square miles. Population 5,600.

San Juan de las Yeras; an interior city in province of Santa Clara. Population 1,469.

San Juan del Norte; barrio in municipal district of Candelaria, province of Pinar del Rio.

San Juan de los Remedios; municipal district in province of Santa Clara. Area 158 square miles. Population 14,833.

San Juan y Martinez; municipal district in province of Pinar del Rio. Area 154 square miles. Population 14,787.

San Juan y Martinez; village in municipal district of same name, near southern coast, province of Pinar del Rio.

San Juan y Martinez; barrio in municipal district of San Juan y Martinez, province of Pinar del Rio. Population 2,970.

San Juan y Martinez, Rio; river flowing to south coast in western part of province of Pinar del Rio.

San Julian; barrio in municipal district of Guines, province of Habana.

San Leandro; village in municipal district of Palma Soriano, province of Santiago.

San Leandro; barrio in municipal district of Palma Soriano, province of Santiago. Population 1,003.

San Lorenzo; village in municipal district of Holguin, province of Santiago.

San Lorenzo; barrio in municipal district of Holguin, province of Santiago. Population 1,060.

San Lorenzo; barrio in municipal district of Santa Cruz del Norte, province of Habana.

San Lorenzo, Laguna de; lake in southern part of municipal district of Holguin, province of Santiago.

San Luis; municipal district in province of Pinar del Rio. Area 154 square miles. Population 7,608.

San Luis; municipal district in province of Santiago. Area 68 square miles. Population 11,681.

San Luis; an interior city in province of Santiago. Population 5,059.

San Luis; barrio in municipal district of San Luis, province of Pinar del Rio. Population 3,553.

San Manuel; village in northeastern part of municipal district of Puerto Padre, province of Santiago.

San Manuel; barrio in municipal district of Puerto Padre, province of Santiago. Population 2,783.

San Marcos; village in municipal district of Santo Domingo, province of Santa Clara.

San Marcos; barrio in municipal district of Santo Domingo, province of Santa Clara.

San Marcos, Lomas de; hills in Habana Province.

San Marcos, Rio; river flowing to north coast in western part of province of Pinar del Rio.

San Matias; village in Habana Province.

San Matias; barrio in municipal district of Santa Cruz del Norte, province of Habana.

San Miguel; village in municipal district of Cabañas, province of Pinar del Rio.

San Miguel; village in municipal district of Guamacaro, province of Matanzas.

San Miguel; barrio and village in municipal district of Bahia Honda, province of Pinar del Rio.

San Miguel; barrio in municipal district of Cabañas, province of Pinar del Rio.

San Miguel; barrio in municipal district of Guamacaro, province of Habana. Population 374.

San Miguel; barrio in municipal district of Nuevitas, province of Puerto Principe. Population 716.

San Miguel, Rio; river flowing to north coast, in province of Pinar del Rio.

San Miguel, Rio; branch of Rio Jaruco, in Habana Province.

San Miguel del Padron; village in Habana Province.

San Miguel del Padron; barrio in municipal district of Guanabacoa, province of Habana.

San Nicolas; village in Habana Province.

San Nicolas; municipal district in province of Habana. Area 105 square miles. Population 4,568.

San Nicolas; barrio in municipal district of Ciego de Avila, province of Puerto Principe. Population 493.

San Nicolas; barrio in municipal district of San Nicolas, province of Habana.

San Nicolas, Rio; river in Habana Province flowing to south coast.

San Pablo; barrio in municipal district of Consolacion del Sur, province of Pinar del Rio.

San Pedro; village near south coast, in municipal district of Trinidad, province of Santa Clara.

San Pedro, Arroyo; stream uniting with Rio Tajacon to form Tacajo River in Santiago Province.

San Pedro, Arroyo; stream in western part of municipal district of Puerto Padre, province of Santiago.

San Pedro; barrio in municipal district of Bauta, province of Habana.

San Pedro; barrio in municipal district of Guines, province of Habana.

San Pedro; barrio in municipal district of Santa Cruz del Sur, province of Puerto Principe. Population 240.

San Pedro; barrio in municipal district of Ste. Marie del Rosario, province of Habana. Population 1,285.

San Pedro; barrio in municipal district of Trinidad, province of Santa Clara. Population 892.

San Pedro, Cerro de; hill in central part of Isla de Pinos.

San Pedro, Rio; river in province of Puerto Principe, municipal district of Puerto Principe, flowing to south coast. Length 60 miles.

San Pedro, Rio de; river flowing to west coast in Isla de Pinos.

San Pedro de Cacocum; barrio in municipal district of Holguin, province of Santiago. Population 1,323.

San Pedro de Maniabon; village in municipal district of Holguin, province of Santiago.

San Pedro Mayabon; village in eastern part of province of Matanzas.

San Rafael, Lomas de; hills in Habana Province.

San Ramon; barrio in municipal district of Cabañas, province of Pinar del Rio.

San Ramon; barrio in municipal district of Campechuela, province of Santiago. Population 1,966.

San Sebastian, Cuchillas de; ridge in municipal district of Mantua, province of Pinar del Rio.

San Sebastian, Rio; river flowing to south coast in western part of province of Pinar del Rio.

San Tomas; barrio in municipal district of Viñales, province of Pinar del Rio. Population 1,570.

San Valentin; barrio in municipal district of Quemado de Guines, province of Santa Clara. Population 343.

San Vincente; village in municipal district of Esperanza, province of Santa Clara.

San Vincente; barrio in municipal district of Esperanza, province of Santa Clara. Population 1,138.

San Vincente; barrio in municipal district of Viñales, province of Pinar del Rio. Population 1,937.

Sanches, Arroyo; stream in northern part of Ciego de Avila, province of Puerto Principe.

Sancti Spiritus; municipal district in province of Santa Clara. Area 1,262 square miles. Population 25,709.

Sancti Spiritus; interior city in province of Santa Clara. Population 12,696.

Sandoval; town in municipal district of Moron, province of Puerto Principe.

Sandoval; barrio in municipal district of Moron, province of Puerto Principe. Population 1,028.

Santa Ana; municipal district in province of Matanzas. Area 60 square miles. Population 2,965.

Santa Ana; an interior city in province of Matanzas. Population 1,421.

Santa Ana; barrio in municipal district of Guanajay, province of Pinar del Rio. Population 765.

Santa Ana, Arroyo; right-hand branch of Rio Jababo, in province of Puerto Principe.

Santa Ana, Arroyo; small left-hand branch of Rio Sevilla in Puerto Principe Province.

Santa Ana, Lomas de; hills in Habana Province.

Santa Ana, Lomas de; hills in municipal district of Mantua, province of Pinar del Rio.

Santa Ana de Pastora; village in municipal district of Mantua, province of Pinar del Rio.

Santa Barbara; barrio in municipal district of Bejucal, province of Habana.

Santa Barbara; barrio in municipal district of Jaruco, province of Habana.

Santa Barbara; barrio in municipal district of Tapaste, province of Habana.

Santa Barbara, Rio; branch of Quivican River in Habana Province.

Santa Barbara, Rio; right-hand branch of Rio Hanabana, province of Matanzas.

Santa Brigida, Montes de; hills in Habana Province.

Santa Catalina, Arroyo; right-hand branch of Rio de las Caravelas, province of Puerto Principe.

Santa Catalina, Cuchillas; hills in western part of municipal district of Baracoa, province of Santiago.

Santa Clara; a province of Cuba, occupying the central part of the island, stretching from the north to the south coast, with an area of 9,560 square miles. The surface is, in the main, rolling and undulating, with some broken hills in the southeastern part. The population in 1899 was 356,536, the density of population being 37 to the square mile. The urban population comprises 23 per cent of the total population. Males are in excess of females to the extent of 6 per cent. The population was distributed as to race and nativity in the proportion of 60 per cent native whites, 10 per cent foreign born, and 30 per cent colored. Of the total population, one-third were unable to read. The province is divided into 28 municipal districts. The capital and chief city is Santa Clara, in the central portion of the province.

Santa Clara; municipal district in province of Santa Clara. Area 540 square miles. Population 28,437.

Santa Clara; an interior city and capital of the province of Santa Clara. Often known as Villa Clara. Population 13,763.

Santa Clara; village in municipal district of Consolacion del Sur, province of Pinar del Rio.

Santa Clara; village in municipal district of Holguin, province of Santiago.

Santa Clara; barrio in municipal district of Consolacion del Sur, province of Pinar del Rio. Population 645.

Santa Clara, Bahia; bay on north coast of province of Santa Clara.

Santa Clarita; village in municipal district of Camajuani, province of Santa Clara.

Santa Clarita; barrio in municipal district of Camajuani, province of Santa Clara. Population 1,501.

Santa Cruz; village in municipal district of Guantanamo, province of Santiago.

Santa Cruz; barrio in municipal district of Bainoa, province of Habana.

Santa Cruz, Arroyo: right-hand branch of Rio de las Caravelas, in province of Puerto Principe.

Santa Cruz, Rio; river in Habana province, flowing to north coast.

Santa Cruz del Norte; municipal district in province of Habana. Area 81 square miles. Population 2,965.

Santa Cruz del Norte; barrio in municipal district of Santa Cruz del Norte, province of Habana. Population 934.

Santa Cruz del Sur; municipal district in province of Puerto Principe. Area 1,162 square miles. Population 5,308.

Santa Cruz del Sur; a coast city in province of Puerto Principe. Population 1,210.

Santa Cruz de Los Pinos; village in municipal district of San Cristobal, province of Pinar del Rio.

Santa Cruz de Los Pinos; barrio in municipal district of San Cristobal, province of Pinar del Rio. Population 1,357.

Santa Fe; city in Isla de Pinos, province of Habana. Population 1,050.

Santa Fe; village in eastern part of Isla de Pinos.

Santa Fe; village in municipal district of Ceja de Pablo, province of Santa Clara.

Santa Fe; barrio in municipal district of Isla de Pinos, province of Habana. Population 1,050.

Santa Fe; barrio in municipal district of Rancho Veloz, province of Santa Clara. Population 2,982.

Santa Fe; barrio in municipal district of Viñales, province of Pinar del Rio. Population 657.

Santa Fe, Lomas de; hills in Habana Province.

Santa Fe, Lomas de; hills in northern part of province of Santa Clara.

Santa Fe, Rio de; river flowing to east coast in Isla de Pinos. Length 10 miles.

Santa Filomena; barrio in municipal district of Palma Soriano, province of Santiago. Population 682.

Santa Gertrudis; town in northern part of province of Puerto Principe, municipal district of Moron.

Santa Gertrudis; barrio in municipal district of Moron, province of Puerto Principe. Population 752.

Santa Isabel; village in municipal district of Mantua, province of Pinar del Rio.

Santa Isabel; barrio in municipal district of Mantua, province of Pinar del Rio.

Santa Isabel, Arroyo; right-hand branch of Rio Caunao, in municipal district of Puerto Principe, province of Puerto Principe.

Santa Isabel, Ensenada; small bay on west coast of province of Pinar del Rio.

Santa Isabel, Lomas de; hills near coast in municipal district of Mantua, province of Pinar del Rio.

Santa Isabel, Rio; river flowing to west coast in province of Pinar del Rio.

Santa Isabel, de las Lajas; an interior city in province of Santa Clara. Population 3,042.

Santa Lucia; barrio in municipal district of Gibara, province of Santiago. Population 3,436.

Santa Lucia; barrio in municipal district of Sancti Spiritus, province of Santa Clara. Population 554.

Santa Lucia, Arroyo; small branch of Arroyo Pablo in municipal district of Moron, province of Puerto Principe.

Santa Lucia, Ensenada; small bay on northwest coast of province of Pinar del Rio.

Santa Lucia, Rio; river flowing to north coast in western part of province of Pinar del Rio.

Santa Lucia, Rio; small river flowing to west coast in province of Pinar del Rio.

Santa Lucia, Punta; point on northwest coast of province of Pinar del Rio.

Santa Maria; village in municipal district of Holguin, province of Santiago.

Santa Maria; village in municipal district of Mantua, province of Pinar del Rio.

Santa Maria; barrio in municipal district of Mantua, province of Pinar del Rio.

Santa Maria, Arroyo; small stream flowing to north coast in municipal district of Holguin, Santiago Province.

Santa Maria, Rio; left-hand branch of Rio Yeguas in province of Puerto Principe.

Santa Maria, Cayo; islet off west coast of province of Puerto Principe.

Santa Maria, Montes de; mountains in municipal district of Alto Songo, province of Santiago.

Santa Maria del Rosario; municipal district in province of Habana. Area 27 square miles. Population 2,730.

Santa Maria del Rosario; barrio in municipal district of Santa Maria del Rosario, province of Habana.

Santa Monica; village in municipal district of same name, province of Pinar del Rio.

Santa Monica; barrio in municipal district of Julian Diaz, province of Pinar del Rio.

Santa Rita; village in municipal district of Cobre, province of Santiago.

Santa Rita; barrio in municipal district of Cobre, province of Santiago. Population 514.

Santa Rita; barrio in municipal district of Jiguani, province of Santiago. Population 839.

Santa Rita, Montes de; hills in Habana Province.

Santa Rosa; barrio in municipal district of San Antonio de los Baños, province of Habana. Population 457.

Santa Rosa; barrio in municipal district of Santa Isabel de las Lajas, province of Santa Clara.

Santa Rosa, Arroyo; stream flowing to north coast in province of Santa Clara, municipal district of Yaguajay.

Santa Rosa, Rio; river flowing to coast in western part of province of Pinar del Rio.

Santa Rosa de Aguacate; village in Habana Province.

Santa Rosalia; village and wharf on north coast of municipal district of Gibara, province of Santiago.

Santa Rosalia; barrio in municipal district of Gibara, province of Santiago. Population 873.

Santa Teresa; barrio in municipal district of Guane, province of Pinar del Rio.

Santa Teresa, Loma de; hills on south coast of province of Santa Clara, municipal district of Cienfuegos.

Santiago; the easternmost and largest of the provinces of Cuba, having an area of 12,468 square miles. The surface is mountainous or hilly, in this respect presenting a sharp contrast to the portions of the island farther west. For a considerable distance the south coast is bordered by a high range of mountains—Sierra Maestra—one peak of which, Turquino, has an altitude reported to be in excess of 8,000 feet, with many other summits exceeding 5,000 feet. The interior of the province consists of a highly dissected table-land, ranging in altitude from 1,000 to 2,000 feet above sea level. This plateau is separated from the southern range, Sierra Maestra, by the broad and fertile valley of the Rio Cauto, the largest river in the island. The population of Santiago is 327,715, and the number of inhabitants to the square mile 26. Of the total population 18 per cent live in towns and cities exceeding 8,000 inhabitants each. The sexes are nearly equal in number. As to race and nativity, 51 per cent, or a trifle more than one-half, are native whites, and 4 per cent are of foreign birth; 45 per cent are colored, the proportion of colored being greater than in any other province. Of the total population only 27 per cent were able to read, the proportion being smaller than in any other province, with the exception of Pinar del Rio. The province is divided into 19 municipal districts. The capital is Santiago, situated upon the southern coast, on a bay of the same name.

Santiago; city, capital of province of the same name, situated at the head of Santiago Harbor. Population 43,090.

Santiago; barrio in municipal district of Cartagena, province of Santa Clara. Population 559.

Santiago, Arroyo; stream sinking in marsh in eastern part of Isla de Pinos.

Santiago, Rio; river flowing to north coast in province of Pinar del Rio.

Santiago de Cuba; municipal district in province of Santiago. Area 7 square miles. Population 45,478.

Santiago de las Vegas; municipal district in province of Habana. Area 29 square miles. Population 10,276.

Santiago de las Vegas; an interior city in province of Habana. Population 7,151.

Santo; barrio in municipal district of Calabazar, province of Santa Clara. Population 2,573.

Santo Cristo, Lomas del; hills in Habana Province.

Santo Cristo, Viejo; village in municipal district of Candelaria, province of Pinar del Rio.

Santo Domingo; municipal district in province of Santa Clara. Area 291 square miles. Population 10,372.

Santo Domingo; interior city in province of Santa Clara. Population 2,079.

Santo Domingo; barrio and village in municipal district of Los Palacios, province of Pinar del Rio.

Santo Domingo, Rio; river flowing to north coast in province of Santiago.

Santo Domingo, Rio; right-hand branch of Rio Hanabana, in province of Matanzas.

Santo Filomena; village in municipal district of Palma Soriano, province of Santiago.

Santo Tomas; barrio in municipal district of Santiago de Cuba, province of Santiago. Population 8,035.

Sao Arriba; village in municipal district of Holguin, province of Santiago.

Sao Arriba; barrio in municipal district of Holguin, province of Santiago. Population 1,080.

Sarey, Arroyo; stream in municipal district of Guantanamo, province of Santiago, flowing into Lake Lamarga.

Sebalo, Caleta de; small bay on south coast of province of Santa Clara.

Seborucal; barrio in municipal district of San Antonio de los Baños, province of Habana. Population 452.

Seborucal, El; hills in northern part of province of Santa Clara.

Seboruco, Arroyo; right-hand branch of Rio Jarahueca in Santiago Province.

Seboruco, Montes; mountains in municipal district of Alto Songo, province of Santiago.

Seboruco, Punta; point on north coast province of Matanzas.

Seco, Arroyo; small stream and cove on north coast of province of Santiago, municipal district of Gibara.

Seco, Arroyo; creek in southern part of municipal district of Cobre, province of Santiago.

Seco, Arroyo; creek flowing to north coast of municipal district of Gibara, province of Santiago.

Seco, Laguna; small lake in municipal district of Cienfuegos, province of Santa Clara.

Seco, Rio; branch of Rio la Majagua, in Habana Province.

Seco, Rio; short stream flowing into Lake Amarga, municipal district of Guantanamo, province of Santiago.

Seco de la Guira, Rio; small branch of Rio Tayabacoa in southern part of province of Santa Clara.

Segundo de Martinez; barrio in municipal district of San Juan y Martinez, province of Pinar del Rio. Population 893.

Seguro, Puerto; small port on north coast of province of Santiago.

Seiba; village in municipal district of Cabañas, province of Pinar del Rio.

Seibabo; town near north coast in municipal district of Yaguajay, province of Santa Clara.

Seibabo; village near head of Rio Sagua la Grande in municipal district of Santa Clara, province of Santa Clara.

Seibabo; barrio in municipal district of Santa Clara, province of Santa Clara. Population 1,598.

Seibabo; barrio in municipal district of Yaguajay, province of Santa Clara. Population 1,371.

Seibabo, Rio; small right-hand branch of Rio Manati in municipal district of Trinidad, province of Santa Clara.

Semillero; village in municipal district of Macagua, province of Matanzas.

Senado; barrio in municipal district of Nuevitas, province of Puerto Principe. Population 2,687.

Sequito, Rio; left-hand branch of Rio San Sebastian, western part of province of Pinar del Rio.

Serones, Punta; point on south coast of municipal district of Guantanamo, province of Santiago.

Serpenton, Lomas del; hills in Habana Province.

Serranos; barrio in municipal district of Guane, province of Pinar del Rio.

Serranos, Rio Las; a tributary of Rio San Felipe in western part of province of Pinar del Rio.

Sevilla; village in southern part of municipal district of Cobre, province of Santiago.

Sevilla; barrio in municipal district of Caney, province of Santiago. Population 561.

Sevilla; barrio in municipal district of Cobre, province of Santiago. Population 272.

Sevilla, Punta; point on west coast of municipal district of Niquero, Santiago Province.

Sevilla, Punta de; point on south coast of province of Puerto Principe, near mouth of Sevilla River.

Sevilla, Rio; river in province of Puerto Principe. Heads in Loma del Sibanicu and flows south and southeast to coast. Length 45 miles.

Sibanacan; barrio in municipal district of Guira de Melena, province of Habana. Population 1,136.

Sibanicu; town near hills of same name in municipal district of Puerto Principe, province of Puerto Principe.

Sibanicu; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 1,763.

Sibanicu, Lomas de; hills in eastern part of municipal district of Puerto Principe, province of Puerto Principe.

Sieba, Sierra de la; mountains in central part of Isla de Pinos.

Sierra; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 533.

Sierra; barrio in municipal district of Los Palacios, province of Pinar del Rio.

Sierra de Caballos; barrio in municipal district of Isla de Pinos, province of Habana.

Sierra de Casa; barrio in municipal district of Isla de Pinos, province of Habana.

Sierra de Casas, Rio de; stream flowing to north coast in Isla de Pinos into small bay of same name.

Sierra Derrumbado; barrio in municipal district of Mantua, province of Pinar del Rio. Population 757.

Sierra Morena; village near north coast in municipal district of Ceja de Pablo, province of Santa Clara.

Sierra Morena; barrio in municipal district of Ceja de Pablo, province of Santa Clara. Population 2,702.

Sierra Morena, Punta de; point on north coast of province of Santa Clara.

Sigua, Surgidero la; anchorage on south coast of municipal district of Santiago de Cuba, Santiago Province.

Siguaguas; village in municipal district of Cardenas, northern part of province of Matanzas.

Sigual; barrio in municipal district of Guantanamo, province of Santiago. Population 402.

Siguanea, Cerro de la; hill in western part of Isla de Pinos.

Siguanea, Ensenada de la; bay on western coast of Isla de Pinos.

Siguanea, Laguna la; lake in municipal district of Guane, southern part of province of Pinar del Rio.

Siguanea, Rio de la; river in western part of Isla de Pinos.

Siguas, Punta de; point on north coast of province of Santiago.

Siguas, Rio; short stream flowing to coast in municipal district of Santiago de Cuba, province of Santiago.

Silencio, Loma del; hills in municipal district of Cobre, province of Santiago.

Silencio, Punta del; point on north coast of province of Santiago.

Silverio, Punta; point on north coast of province of Santiago.

Sin Nombre, Punta; point on south coast of province of Pinar del Rio.

Sin Nombres, Lomas; hills in northern part of province of Santa Clara.

Sinu; barrio in municipal district of Jaguey Grande, province of Matanzas. Population 816.

Sipiabo, Rio; left-hand branch of Rio Manati, province of Santa Clara.

Sitio; barrio in municipal district of Baracoa, province of Santiago. Population 473.

Sitio; barrio in municipal district of Palma Soriano, province of Santiago. Population 1,335.

Sitiocito; village in municipal district of Sagua la Grande, province of Santa Clara.

Sitiocito; barrio in municipal district of Sagua la Grande, province of Santa Clara. Population 1,366.

Sitio Grande; village in municipal district of Calabazar, province of Santa Clara.

Sitio Grande; barrio in municipal district of Calabazar, province of Santa Clara. Population 590.

Sitio Grande; barrio in municipal district of Cifuentes, province of Santa Clara. Population 680.

Sitio Herrero; barrio in municipal district of San Cristobal, province of Pinar del Rio. Population 231.

Sitio Nuevo; village in municipal district of San Diego del Valle, province of Santa Clara.

Sitio Nuevo; barrio in municipal district of San Diego del Valle, province of Santa Clara. Population 359.

Sitio Potrero; barrio in municipal district of Placetas, province of Santa Clara.

Sitio Viejo; village in northern part of municipal district of Baracoa, province of Santiago.

Sitio Viejo; barrio in municipal district of Ranchuelo, province of Santa Clara. Population 939.

Socarreno, Arroyo; left-hand branch of Rio Cacuyaguin in municipal district of Gibara, province of Santiago.

Socarreno, Sierra de; mountains in northern part of province of Santiago, near coast.

Socarrona, Lomas; hills in municipal district of Mayari, province of Santiago.

Socorro; barrio and village in municipal district of Alto Songo, province of Santiago.

Sol, Punta del; point on north coast of province of Santiago.

Solavento, Punta; point at entrance of Bahia Mariel, north coast of province of Pinar del Rio.

Soldados, Punta de los; point on east coast of province of Santiago.

Soledad; village in municipal district of Cartagena, province of Santa Clara.

Soledad; village in municipal district of San Diego de los Baños, province of Pinar del Rio.

Soledad; barrio in municipal district of Cartagena, province of Santa Clara. Population 762.

Soledad; barrio in municipal district of Santa Cruz del Norte, province of Habana.

Soledad, Arroyo de la; small stream flowing to coast in municipal district of Puerto Principe, province of Puerto Principe.

Soledad, Rio; branch of Rio Mala in southern part of province of Puerto Principe.

Solis; village in municipal district of Cobre, province of Santiago.

Solis Arroyo; right-hand branch of Rio Castro, municipal district of Sagua de Tanamo, province of Santiago.

Sombrero, Cayo; islet off north coast of province of Santa Clara.

Somaula, Loma; hills in municipal district of Cobre, province of Santiago.

Somautes, Loma; hill in municipal district of Sagua de Tanamo, province of Santiago.

Sorda, Punta de la; point on west coast of San Antonio peninsula, province of Pinar del Rio.

Sotolongo, Monte; hill in Habana Province.

Sucia, Punta; point on south coast of province of Pinar del Rio.

Sumidero; village in municipal district of Guamacaro, province of Matanzas.

Sumidero; village in municipal district of Pinar del Rio, province of Pinar del Rio.

Sumidero; barrio in municipal district of Guamacaro, province of Matanzas. Population 220.

Sumidero; barrio in municipal district of Pinar del Rio, province of Pinar del Rio. Population 2,478.

Sumidero, Arroyo del; left-hand branch of Rio Cuyaguateje in western part of province of Pinar del Rio.

Sumidero, Valle del; valley in Sierra de Organos, municipal district of Pinar del Rio, province of Pinar del Rio.

Sur; barrio in municipal district of Alacranes, province of Matanzas. Population 1,053.

Sur; barrio in municipal district of Canasi, province of Matanzas. Population 369.

Surgidero; a coast city in province of Habana. Population 3,683.

Surgidero; barrio in municipal district of Batabano, province of Habana. Population 3,683.

Tabacal, Punta; point on south coast of municipal district of Cobre, province of Santiago.

Tabaco, Loma del; hills near north coast of municipal district of Puerto Padre, province of Santiago.

Tabaco, Punta; point on west coast of province of Pinar del Rio.

Tablas; barrio in municipal district of Jaruco, province of Habana.

Tacajo; town on river of same name in municipal district of Holguin, province of Santiago.

Tacajo; barrio in municipal district of Holguin, province of Santiago. Population 896.

Tacajo, Rio; river in province of Santiago. Heads in hills in northern part of municipal district of Holguin and flows east into Bahia de Nipe. Length 15 miles.

Tacamara; village in municipal district of Holguin, province of Santiago.

Tacamara; barrio in municipal district of Holguin, province of Santiago. Population 832.

Taco, Ensenada; small bay on north coast of Baracoa, province of Santiago.

Tacre, Rio; river in southern part of municipal district of Baracoa, Santiago Province.

Taguasco; barrio in municipal district of Sancti Spiritus, province of Santa Clara.

Taguasco, Rio; left-hand branch of Rio Zaza, in municipal district of Sancti Spiritus, province of Santa Clara.

Taguayabon; village in northern part of province of Santa Clara, municipal district of Las Vueltas.

Taguayabon; barrio in municipal district of San Antonio de las Vueltas, province of Santa Clara. Population 912.

Tairones; village in municipal district of Pinar del Rio, province of Pinar del Rio.

Tairones; barrio in municipal district of Pinar del Rio, province of Pinar del Rio. Population 4,694.

Tajababo, Surgidero; anchorage on coast of municipal district of Santiago de Cuba, Santiago Province.

Tajacon, Rio; short branch of Rio Tacajo, in municipal district of Holguin, Santiago Province.

Talanquera, Punta; point on north coast of Habana Province.

Tana, Punta de; point on south coast of province of Puerto Principe.

Tana, Punta; point on west coast of province of Santiago.

Tana, Rio; river in province of Puerto Principe flowing to south coast. Length 33 miles.

Tana, Rio; river flowing to south coast in province of Puerto Principe.

Tana, Rio; small river flowing to west coast of province of Santiago.

Tanamo, Boca de; cove on north coast of municipal district of Sagua de Tanamo, province of Santiago.

Tanamo, Ensenada; small bay on north coast of municipal district of Sagua de Tanamo, province of Santiago.

Tanamo, Punta de; point on north coast of municipal district of Sagua de Tanamo, Santiago Province.

Taneo; barrio in municipal district of Caibarien, province of Santa Clara. Population 663.

Tapaste; municipal district in province of Habana. Area 30 square miles. Population 1,551.

Tapaste; village in Habana Province.

Tapaste; barrio in municipal district of Tapaste, province of Habana.

Tapaste, Lomas de; hills in Habana Province.

Tarara, Rio; small stream in Habana province flowing to north coast.

Tarquino, Punta; point on coast of municipal district of Cobre, southern part of Santiago Province.

Tarquino, Surgidero; anchorage on coast of municipal district of Cobre, southern part of province of Santiago.

Tasageras, Rio; river in municipal district of Gibara, province of Santiago, flowing into Bahia de Banes.

Tayaba; barrio in municipal district of Trinidad, province of Santa Clara. Population 989.

Tayaba, Rio; river flowing to south coast in municipal district of Trinidad, province of Santa Clara.

Tayabacoa, Rio; river flowing to south coast in municipal district of Sancti Spiritus, province of Santa Clara.

Teneria; village in municipal district of Guane, province of Pinar del Rio.

Teneria; barrio in municipal district of Guane, province of Pinar del Rio.

Teneria, Arroyo; short branch of Rio Salado, in western part of province of Pinar del Rio.

Terry; barrio in municipal district of Santa Isabel de las Lajas, province of Santa Clara. Population 817.

Tesico, Ensenada de; creek and inlet on north coast of province of Santa Clara, municipal district of Caibarien.

Tesoro, Laguna del; lake in Cienaga Zapata, province of Santa Clara.

Tetas Pujaron; hills in southeastern part of municipal district of Baracoa, province of Santiago.

Tetuan; barrio in municipal district of San Juan de las Remedios, province of Santa Clara. Population 294.

Ti Arriba; village in municipal district of Alto Songo, province of Santiago.

Ti Arriba; barrio in municipal district of Alto Songo, province of Santiago. Population 2,015.

Tibisial; barrio in municipal district of Placetas, province of Santa Clara.

Tiburcio, Punta; point on south coast of municipal district of Manzanillo, Santiago Province.

Tibijal, Punta; point on south coast of province of Santiago, municipal district of Cobre.

Tiguabo; village in municipal district of Guantanamo, province of Santiago.

Tiguabos; barrio in municipal district of Guantanamo, province of Santiago. Population 1,538.

Tinas, Arroyo de las; stream rising in interior of Isla de Pinos and sinking in marsh in southern part.

Tintorera, Punta la; point on south coast of province of Santiago.

Tio Ignacio, Paso; pass in Sierra del Jobo, province of Santiago.

Tio Pedro, Ensenada de; small bay on north coast of province of Puerto Principe.

Tirado; village in municipal district of San Luis, province of Pinar del Rio.

Tirado; barrio in municipal district of San Luis, province of Pinar del Rio. Population 648.

Toa; village on Toa River in southwestern part of municipal district of Baracoa, province of Santiago.

Toa, Cuchillas de; hills in municipal district of Baracoa, province of Santiago.

Toa, Rio; river in province of Santiago. Heads in western part of municipal district of Baracoa and flows southeast and northeast to coast near city of Baracoa. Length 65 miles.

Toar; barrio in municipal district of Baracoa, province of Santiago.

Tocinera, Cayos de la; group of islands north of province of Santa Clara, belonging to municipal district of Calabazar.

Tolete, Punta; point on north coast of San Antonio peninsula, province of Pinar del Rio.

Tolete, Punta; point on south coast of province of Santa Clara.

Tollosa, Punta; point on north coast of province of Santa Clara.

Tolo, Rio; river in municipal district of Sagua de Tanamo, province of Santiago.

Tomales, Ensenada los; small bay on north coast of municipal district of Holguin, Santiago Province.

Tomeguin; barrio in municipal district of Roque, province of Matanzas.

Toro; barrio in municipal district of Los Palacios, province of Pinar del Rio.

Toro, Arroyo; left-hand branch of Mayari River in Santiago Province.

Toro, Caleta del; small bay on south coast of province of Santa Clara.

Toro, Loma del; hill in southern part of municipal district of Cobre, province of Santiago.

Torre, Peninsula de la; peninsula on north coast of province of Santiago between Bahia de Nipe and ocean.

Tortugilla, Punta; point on south coast of province of Santiago.

Tramajos; barrio in municipal district of Macuriges, province of Matanzas. Population 404.

Tranquilidad; barrio in municipal district of Manzanillo, province of Santiago. Population 834.

Tres Ciebas; village in northern part of province of Matanzas.

Triana, Lomas de; hills in northern part of province of Matanzas.

Trilladeras, Arroyo; left-hand branch of Rio Jatibonico, in municipal district of Moron, province of Puerto Principe,

Trinidad; municipal district in province of Santa Clara. Area 828 square miles. Population 24,271,

Trinidad; city near coast in province of Santa Clara. Population 11,120.

Trinidad; barrio in municipal district of Guane, province of Pinar del Rio.

Trinidad; barrio in municipal district of Jaruco, province of Habana.

Trinidad; barrio in municipal district of Santiago de Cuba, province of Santiago. Population 6,887.

Triste, Cayo; islet north of province of Santa Clara.

Triunfo, Loma de; hill in Habana Province.

Trujillo, Punta; point on north coast of province of Santa Clara.

Tuerto, Pico; peak in western part of municipal district of Sancti Spiritus, province of Santa Clara.

Tuinuco, Rio; right-hand branch of Rio Zaza, in province of Santa Clara, heading in hills in western part of municipal district of Sancti Spiritus. Length 30 miles.

Tulipan; village in Habana Province, suburb of Habana.

Tumba; village in Habana Province.

Tumba Cuatro; village in Habana Province.

Tumbadera; village on north coast of province of Pinar del Rio, in municipal district of San Diego de Nuñez.

Tumbadera; barrio in municipal district of Alquizar, province of Habana. Population 1,310.

Tumbadero; barrio in municipal district of Guira de Melena, province of Habana. Population 632.

Tumba la Olla, Cayos; group of small islands north of province of Santa Clara.

Tuna, Laguna la; small lake in southern part of municipal district of Holguin, province of Santiago.

Tuna, Punta de la; point on southern coast of province of Puerto Principe, municipal district of Moron.

Tuna, Punta; point on south coast of province of Santa Clara, at mouth of Rio Salado.

Tunal, Punta; point on south coast of municipal district of Moron, province of Puerto Principe.

Tunas; barrio in municipal district of Puerto Padre, province of Santiago. Population 663.

Tunas de Zaza; village on south coast of province of Santa Clara, at mouth of Rio Zaza.

Tunas de Zaza; barrio in municipal district of Sancti Spiritus, province of Santa Clara. Population 1,014.

Turiguano, Isla de; island close to north coast of province of Puerto Principe.

Turquina, Rio; river in the southern part of province of Santiago. Rises in Sierra Maestra and flows to coast.

Turquino, Arroyo; small branch of Rio Turquina, near south coast of Santiago Province.

Turquino, Pico; peak in southern part of province of Santiago, reaching an elevation of 8,320 feet. Highest point in Sierra Maestra and in Cuba.

Ubero, Punta; point on north coast of province of Pinar del Rio.

Ubero, Punta del; point on north coast of municipal district of Holguin, Santiago Province.

Uberos, Bahia de las; small bay on coast of municipal district of Holguin, northern part of Santiago Province.

Uberos, Punta; point at entrance of Bahia Honda, on north coast of province of Pinar del Rio.

Ugao, Rio de; river in southern part of municipal district of Sagua de Tanamo, province of Santiago. Length 20 miles.

Ullao, Rio; left-hand branch of Rio Guanímican, province of Santiago.

Uñas; village in municipal district of Holguin, Santiago Province.

Uñas; barrio in municipal district of Holguin, province of Santiago. Population 1,324.

Unimazo, Rio; left-hand branch of Rio Manati, province of Santa Clara.

Unioa, Punta; point on north coast of island at junction of provinces of Matanzas and Santa Clara.

Union de Reyes; municipal district in province of Matanzas. Area 36 square miles. Population 5,226.

Uvas, Cayos de las; islets north of province of Pinar del Rio.

Vaca, Arroyo de la; left-hand branch of Rio Cascorro, province of Puerto Principe.

Vaca, Cayo; islet north of province of Santa Clara.

Vacabos, Punta; point on south coast of province of Santiago.

Vacia Botizas, Punta; point on south coast of Habana Province.

Valle; barrio in municipal district of San Antonio de los Baños, province of Habana. Population 167.

Valle, Lomas del; hills in Habana Province.

Valle, Rio del; small river flowing to south coast in province of Pinar del Rio.

Vaquero, Surgidero de; anchorage on southeast coast of province of Santiago.

Varadero; barrio in municipal district of Cardenas, province of Matanzas. Population 1,029.

Varas, Ensenada de las; small bay on north coast of province of Santa Clara, municipal district of San Juan de los Remedios.

Vedado; barrio in municipal district of Puerto Padre, province of Santiago. Population 1,200.

Vega Alta; barrio in municipal district of San Antonio de las Vueltas, province of Santa Clara. Population 1,140.

Vega Alta; village in municipal district of Santa Clara, province of Santa Clara.

Vega, Arroyo; small stream on south coast of municipal district of Guantanamo, province of Santiago.

Vegas; barrio in municipal district of Nueva Paz, province of Habana. Population 1,608.

Vegas Nuevas; barrio in municipal district of Consolacion del Norte, province of Pinar del Rio. Population 944.

Veguita; barrio in municipal district of Baracoa, province of Santiago. Population 541.

Veguita; barrio in municipal district of Bayamo, province of Santiago. Population 3,784.

Veguitas; town in western part of municipal district of Bayamo, province of Santiago.

Vela, Arroyo la; short left-hand branch of Rio Toa, in Santiago Province.

Vela, Cayo la; islet north of province of Santa Clara, municipal district of Calabazar.

Vela, Sierra la; mountains in municipal district of Guantanamo, province of Santiago.

Velasco; barrio in municipal district of Holguin, province of Santiago. Population 1,777.

Veliz; barrio in municipal district of Niquero, province of Santiago. Population 580.

Ventas; barrio in municipal district of Jiguani, province of Santiago. Population 1,225.

Ventura, Punta; point on south coast of Habana Province.

Venturilla; village in municipal district of Cuevitas, province of Matanzas.

Venturilla; barrio in municipal district of Cuevitas, province of Matanzas. Population 1,667.

Vereda, Nueva; an interior city in province of Habana. Population 2,416.

Vereda, Nueva; municipal district in province of Habana. Area 14 square miles. Population 2,416.

Verde, Rio; river flowing to west coast in southwestern part of province of Pinar del Rio.

Verde, Sierra; mountains in central part of municipal district of Baracoa, province of Santiago.

Verga, Cala de la; small bay on southern coast of province of Santiago.

Versalles; barrio in municipal district of Cardenas, province of Matanzas.

Vertientes; village in southeastern part of municipal district of Baracoa, province of Santiago.

Viajacas; barrio in municipal district of Bejucal, province of Habana.

Viajacas, Rio; river in Habana Province.

Viajacas, Rio; river flowing into Bahia Honda, north coast of province of Pinar del Rio.

Viana; village in municipal district of Calabazar, province of Santa Clara.

Viana; barrio in municipal district of Calabazar, province of Santa Clara. Population 2,111.

Vibicial, Lomas del; hills in northern part of municipal district of Sagua de Tanamo, province of Santiago.

Vicana; barrio in municipal district of Manzanillo, province of Santiago. Population 1,642.

Victoria de las Tunas; town in central part of municipal district of Puerto Padre, province of Santiago.

Victorio, Lomas de la; hills in Habana Province.

Vieja; village in municipal district of Matanzas, province of Matanzas.

Vieja, Arroyo de la; small left-hand branch of Rio Sagua la Chica, near north coast, in province of Santa Clara.

Vieja, Punta de la; point on north coast of province of Santiago.

Vieja Bermeja; village in municipal district of Cabezas, province of Matanzas.

Viertientes; barrio in municipal district of Baracoa, province of Santiago. Population 650.

Vigia; village near north coast in municipal district of Cabañas, province of Pinar del Rio.

Vigia; barrio in municipal district of Cabañas, province of Pinar del Rio.

Vigia, Punta de la; point on west coast of Isla de Pinos.

Vigia Santa Lucia, Lomas; hills in municipal district of Mantua, province of Pinar del Rio.

Villajana, Loma de; hills in municipal district of Alto Songo, province of Santiago.

Villareal, Monte; hill near north coast of Habana Province.

Viñales; municipal district in province of Pinar del Rio. Area 208 square miles. Population 17,700.

Viñales; an interior city in province of Pinar del Rio. Population 1,600.

Vincula; barrio in municipal district of Guantanamo, province of Santiago. Population 754.

Vino, Ensenada del; small bay on north coast of municipal district of Gibara, province of Santiago.

Virdu, Arroyo; right-hand branch of Canapu River in Santiago Province.

Virtudes; village in municipal district of Artemisa, province of Pinar del Rio.

Virtudes; barrio in municipal district of Artemisa, province of Pinar del Rio. Population 719.

Virtudes; barrio in municipal district of Ceiba del Agua, province of Habana.

Vista Hermosa; town in municipal district of Puerto Principe, province of Puerto Principe.

Vista Hermosa; barrio in municipal district of Placetas, province of Santa Clara.

Vista Hermosa; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 981.

Vita, Ensenada; small bay on north coast of Santiago, municipal district of Gibara.

Voladores, Arroyo; branch of Rio Hanabana in province of Santa Clara.

Vuelta Grande, Ensenada; small bay on south coast of municipal district of Niquero, province of Santiago.

Vueltas; an interior city in the province of Santa Clara. Population 1,336.

Vueltas, Arroyo; small left-hand branch of Rio Zaza, province of Santa Clara.

Vueltas, Rio las; river rising in hills in northern part of municipal district of Ciego de Avila, province of Puerto Principe, and flowing south, where it sinks in coast swamps. Bears name of Arroya la Seiba near coast.

Wajay; barrio in municipal district of Cano, province of Habana. Population 1,887.

Yaba; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 2,295.

Yabason; village on river of same name in municipal district of Gibara, province of Santiago.

Yabason; barrio in municipal district of Gibara, province of Santiago. Population 673.

Yabason, Rio; river in municipal district of Gibara, province of Santiago.

Yabu; village in municipal district of San Diego del Valle, province of Santa Clara.

Yabu; barrio in municipal district of San Diego del Valle, province of Santa Clara. Population 1,130.

Yabu, Rio; right-hand branch of Rio Sagua la Grande in northern part of province of Santa Clara. Length 24 miles.

Yabucito; barrio in municipal district of Santo Domingo, province of Santa Clara. Population 720.

Yacabo Abajo, Rio; river in southern part of municipal district of Baracoa, province of Santiago.

Yagua, Arroyo; small right-hand branch of Rio Zaza in municipal district of Sancti Spiritus, province of Santa Clara.

Yaguajay; municipal district in province of Santa Clara. Area 442 square miles. Population 9,718.

Yaguajay; city near coast in province of Santa Clara. Population 1,206.

Yaguajay; barrio in municipal district of Yaguajay, province of Santa Clara. Population 2,692.

Yaguanabo, Rio; river flowing to south coast in municipal district of Trinidad, province of Santa Clara.

Yaguaneque, Ensenada; small bay on north coast of municipal district of Sagua de Tanama, province of Santiago.

Yaguani, Rio; largest left-hand branch of Toa River, heading in Sierra de Moa. Length 20 miles.

Yaguarama, Rio; river in southern part of province of Santa Clara.

Yaguaramas; village in municipal district of Cienfuegos, province of Santa Clara.

Yaguaramas; barrio in municipal district of Cienfuegos, province of Santa Clara. Population 3,609.

Yaguaramas, Arroyo; stream flowing to south coast in municipal district of Trinidad, province of Santa Clara.

Yaguasos, Arroyo; coast creek in western part of province of Pinar del Rio.

Yagunal, Lomas del; hills in municipal district of Trinidad, southern part of province of Santa Clara.

Yaleras; town in southern part of municipal district of Guantanamo, province of Santiago.

Yaleras, Rio; river rising in northwestern part of municipal district of Guantanamo, province of Santiago, and flowing east, south, and southeast to coast. Length 40 miles.

Yamaniguey, Rio; stream in northern part of municipal district of Baracoa, province of Santiago.

Yamaraguas; barrio in municipal district of Guines, province of Habana.

Yana, Caleta de la; cove on south coast of municipal district of Baracoa, province of Santiago.

Yana, Punta de la; point on south coast of province of Santiago.

Yana, Punta de la; point on south coast of province of Pinar del Rio.

Yana, Punta de la; point on north coast of province of Pinar del Rio.

Yanaguabo, Rio; right-hand branch of Rio Cauto, province of San Diego.

Yara; town on Jicotea River in western part of province of Santiago.

Yara; barrio in municipal district of Manzanillo, province of Santiago. Population 1,234.

Yara, Rio; small river flowing to west coast in municipal district of Manzanillo, province of Santiago.

Yarey; barrio in municipal district of Puerto Padre, province of Santiago. Population 1,231.

Yarey, Lagunas de; lakes in municipal district of Holguin, province of Santiago.

Yarey, Rio; river in northeastern part of municipal district of Puerto Padre, Santiago Province, flowing to coast.

Yareyal; barrio in municipal district of Holguin, province of Santiago. Population 927.

Yareyal, Arroyo; small right-hand branch of Rio Matamoras in municipal district of Holguin, province of Santiago.

Yaribacoa; town on west coast of municipal district of Manzanillo, province of Santiago.

Yarigua, Rio; river heading in hills in western part of province of Puerto Principe, municipal district of Puerto Padre, and flowing north to coast. Length 33 miles.

Yarigua, Rio; right-hand branch of Rio Cabreras, in municipal district of Puerto Padre, Santiago province. Length 24 miles.

Yateras; barrio in municipal district of Guantanamo, province of Santiago. Population 1,651.

Yauza Yana, Rio; river flowing to north coast, in municipal district of Moron, province of Puerto Principe.

Yayabo, Rio; right-hand branch of Rio Zaza, in municipal district of Sancti Spiritus, province of Santa Clara.

Yayal; village in municipal district of Holguin, Santiago Province.

Yayal; barrio in municipal district of Viñales, province of Pinar del Rio. Population 524.

Yeguas; barrio in municipal district of Puerto Principe, province of Puerto Principe. Population 748.

Yeguas, Rio; river in province of Puerto Principe. Rises in western part of municipal district of Puerto Principe and flows southwest to coast. Length 40 miles.

Yenas, Cayo; small island off north coast of municipal district of Sagua de Tanamo, province of Santiago.

Yiguasi, Rio; right-hand branch of Mayari River, in Santiago Province.

Ytabo; barrio in municipal district of Madruga, province of Habana.

Yucatan, La; hills in municipal district of Puerto Principe, province of Puerto Principe.

Yumuri, town in municipal district of Matanzas, Matanzas Province.

Yumuri, Rio; river in province of Matanzas, flowing into Matanzas Bay.

Yumuri, Rio; river in Eastern part of Santiago Province. Heads in Sierra de las Minas y San German, flows east and north to the coast.

Yuraguano, Punta; point on north coast of province of Santiago, municipal district of Holguin.

Zabala; village in northern part of municipal district of Sagua de Tanamo, province of Santiago.

Zabala; barrio in municipal district of Sagua de Tanamo, province of Santiago. Population 887.

Zabaleta; barrio in municipal district of Aguacate, province of Habana.

Zacatecas; barrio in municipal district of Caney, province of Santiago. Population 462.

Zacatecas, Arroyo; left-hand branch of Rio Jiguiamo, in northern part of province of Santa Clara. Length 18 miles.

Zajas, Arroyo; right-hand branch of Bio River in municipal district of Mayari, province of Santiago.

Zulueta; village in municipal district of Camajuani, province of Santa Clara.

Zulueta; barrio in municipal district of Camajuani, province of Santa Clara. Population 1,318.

Zambumbia; barrio in municipal district of Quemado de Guines, province of Santa Clara. Population 848.

Zambumbia, Arroyo; left-hand branch of Mayari River, in Santiago Province.

Zanjon, Arroyo del; small stream flowing to north coast in province of Puerto Principe.

Zapata; barrio in municipal district of Bolondron, province of Matanzas.

Zapata, Cienega de; a great marsh near south coast, 25 miles north and south by 100 miles east and west. The greater part lies in Matanzas Province, separated from a smaller eastern part in Santa Clara Province by Hataguanico River.

Zapata, Peninsula de; large territory in southern part of island, belonging to province of Santa Clara.

Zapote, Paso de; pass in Sierra del Jobo, province of Santiago.

Zarrapanditta, Arroyo; left-hand branch of Rio Jatibonico, municipal district of Moron, province of Puerto Principe.

Zarzal; town on Rio Jicotea in southwestern part of province of Santiago.

Zarzal; barrio in municipal district of Manzanillo, province of Santiago. Population 2,276.

Zarzal, Arroyo; small right-hand branch of Rio Cuyaguateje, in western part of province of Pinar del Rio.

Zarzal, Arroyo; small stream in municipal district of Nuevitas, province of Puerto Principe.

Zaza, Cayo; islet at mouth of Rio Zaza, province of Santa Clara.

Zaza, Rio; an important river in province of Santa Clara. Heads in hills in western part of municipal district of Placetas, and flows southeastward and southwestward to coast. Length 85 miles.

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UNITED STATES GEOLOGICAL SURVEY
CHARLES D. WALCOTT, DIRECTOR

THE GEOLOGICAL RELATIONS AND DISTRIBUTION

OF

PLATINUM AND ASSOCIATED METALS

BY

JAMES FURMAN KEMP

WASHINGTON
GOVERNMENT PRINTING OFFICE
1902

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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
Washington, D. C., June 8, 1901.

SIR: I return herewith a report on platinum, by Prof. J. F. Kemp, which I have read and recommend for publication as a bulletin.

Very respectfully,

S. F. EMMONS,
Geologist in Charge of Section of Metalliferous Ores.

Hon. CHARLES D. WALCOTT,
Director of United States Geological Survey.

THE GEOLOGICAL RELATIONS AND DISTRIBUTION OF PLATINUM AND ASSOCIATED METALS.

By J. F. KEMP.

CHEMICAL RELATIONS.

Platinum is one of seven metals which are customarily described as the "gold group." They are separable into three subgroups, based upon their affinities for oxygen.

(1) "Platinum and gold do not combine directly with oxygen under any circumstances.

(2) "Palladium, rhodium, and iridium oxidize when they are heated in the air or oxygen, but their oxides decompose on strong ignition into metal and oxygen.

(3) "Ruthenium and osmium unite with oxygen to form volatile oxides, which do not undergo decomposition even at the highest temperatures."[a]

With the omission of gold it is likewise customary to speak of the remaining six as the "platinum group."

If we fix attention upon the six it is evident that they are separable into two contrasted divisions according to their atomic weights. Thus, ruthenium (101.7), rhodium (103), and palladium (107) are near together, and then after a large interval platinum (194.9), iridium (193.1), and osmium (191) are likewise closely related. With the last named gold (197.2) is to be placed.

When grouped according to the periodic law they fall into the same two divisions of three each, and as they are placed in the same vertical columns with iron, cobalt, and nickel, it is natural to draw parallels between the latter and the former. Iron, ruthenium, and osmium have similar properties; so also have cobalt, rhodium, and iridium, and, finally, nickel, palladium, and platinum. Palladium and platinum exhibit analogies with silver and gold, while ruthenium and osmium are similarly related to molybdenum and tungsten.

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[a] Roscoe and Schorlemmer, Treatise on Chemistry, II, Part II, p. 359.

An appreciation of these relations is important in enabling the reader to gain a correct conception of the several metals, and it may be added that to a certain degree the same association appears in the geological occurrence; but, as will shortly be pointed out, there are other geological facts on which the chemical relations, so far as present knowledge goes, throw no light. Thus, for example, platinum is almost always derived from rocks rich in magnesium and is commonly associated with chromic oxide, yet neither magnesium nor chromium has been mentioned above.

In specific gravity the purified metals range as follows: Osmium, 22.477; iridium, 22.38; platinum, 21.48; ruthenium, 12.261; rhodium, 12.1; palladium, 11.4.

In fusibility the order is as follows: Osmium is the most refractory and has not been melted; ruthenium, iridium, and rhodium follow in order; platinum is next, and its melting point is fixed at 1,779° C.; palladium is the most fusible of all, and melts at about the same temperature as wrought iron.

MINERALS.

The minerals containing the metals of the platinum group are the following. With each a brief outline of its physical and chemical properties is given, for convenient reference and as a guide in identification. The chief source of this information has been the sixth edition of Dana's Treatise on Mineralogy, and Kokscharow's paper on "Gediegenes Platin," in his Materialen zur Mineralogie Russlands, Vol. V, p. 177. Both these have been supplemented by the writer's experience in the field.

Platinum.—The mineral called by this name is an alloy of platinum, iridium, rhodium, palladium, and often osmium, with varying amounts of iron, copper, and gold. Iridosmine is also usually present, but seems to be mechanically involved in the others. The complex nature suggested to Hausmann the name polyxene, meaning many strangers or guests. Full details are given subsequently regarding the chemical composition of the crude platinum of commerce. The crystals are isometric, but extremely rare. The cube is the commonest form. Nuggets, scales, and irregular grains are the usual shapes, and where taken near the mother rock they may be angular. Somewhat uncommonly chromite constitutes a part of the nuggets, and even other minerals, such as serpentine, olivine, pyroxene, and biotite, have been discovered, as noted later.

Cleavage, none; fracture, hackly. Hardness, 4 to 6. Malleable, ductile, sectile. Sp. gr., 14 to 19. Melted platinum is 19.7 and hammered is 21.23. The admixture of iron especially reduces the specific gravity, as iron itself is 7.3 to 7.8. Low specific gravities therefore indicate much iron. The variety rich in iron is called iron-platinum and its specific gravity ranges below 16. Luster, metallic. Color

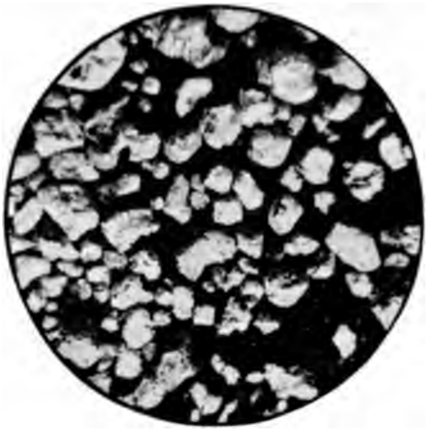
PLATE I.

PLATE I.

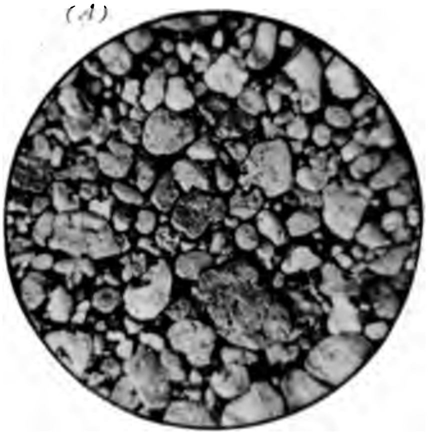
(*A*) Rough, unworn platinum nuggets, Tulameen River, British Columbia. × 35 diam.

(*B*) Thin, worn platinum nuggets, Colorado River, Colombia. × 35 diam.

(*C*) Cubes of sperrylite, prisms of cassiterite, Vermillion mine, Ontario. × 35 diam.



(A)



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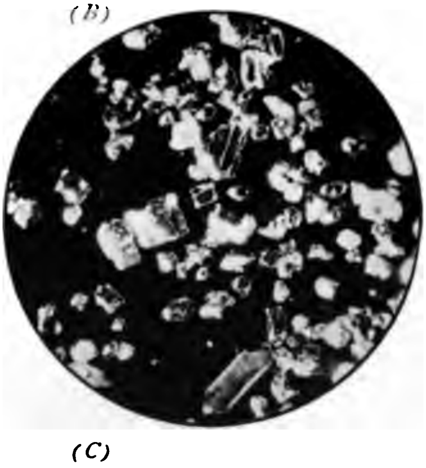

(C)

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varies from silvery white to dark gray or almost black. Strong contrasts appear even in the platinum of a single district. The nuggets may be coated with a black, soluble crust, and when dealing with fine dust the observer may experience the greatest difficulty in recognizing the platinum with a lens or a microscope as against chromite or magnetite. The native platinum may be strongly magnetic, even forming natural lodestone, or it may be comparatively inert. It can, however, be readily separated from less magnetic materials in modern magnetic concentrators, such as the Wetherell. When the nuggets and dust are obtained near the mother rock they are angular and rough (Pl. I, *A*), but when they have been transported far they appear as thin scales (Pl. I, *B*).

Platinum is not essentially affected by the ordinary acids, but yields to boiling aqua regia. As a test of pannings, treatment with ordinary acids is not of much value, because chromite, the commonest associate of platinum, is insoluble. Platinum, if not too small, will be found to be malleable, whereas chromite is brittle. From colors of gold it may be separated by quicksilver, because the gold amalgamates and the platinum does not. Among the placer miners platinum is ofted called "white gold."

Platiniridium.—With a great increase in iridium, which in normal platinum does not exceed 5 per cent, this mineral is developed. The iridium may be over 75 per cent. Crystal system, isometric, the cube being the chief form, but as the mineral itself is excessively rare, and when found is usually in scales and grains, crystals are very uncommon. Hardness, 6.7, surpassing platinum. Sp. gr., 22.6 to 23, being thus the heaviest of known minerals. Color, white. Luster, metallic.

Palladium is alloyed in practically all cases with a little platinum and iridium. It is isometric and when crystallized is practically always in octahedrons, but it also occurs in grains and fibrous masses. In any form it is excessively rare. Hardness, 4.5 to 5. Sp. gr., 11.3 to 11.8. Luster, metallic. Color, whitish, steel-gray. Malleable, ductile, sectile.

Allopalladium.—An allotropic form of palladium, hexagonal in crystallization, forming small 6-sided tables. Color, silver-white to pale steel-gray. Excessively rare.

Iridosmine (often called osmiridium).—This is an alloy of iridium and osmium. The other metals of the platinum group are very subordinate, platinum itself being at most under 3 per cent. Ruthenium, however, which fails in platinum, may reach 8 per cent, and is usually present. Hexagonal, but almost always in flattened grains (see Pl. V, *A*). Hardness, 6.7. Sp. gr., 18.8 to 21.12, being thus heavier than platinum, but less heavy than platiniridium. Luster, metallic. Color, tin-white to steel-gray. Iridosmine is a minor associate of platinum, but is harder. Two varieties have been made, based on Siberian occurrences, viz, newjanskite, with over 40 per cent iridium, and sisserskite, under 30 per cent iridium. No provision seems to have been made for percentages between 30 and 40, but none appear in analyses yet recorded. Sisserskite has a slightly higher specific gravity than newjanskite.

All the above minerals are alloys. There are but two definite natural compounds known of any metals of the platinum group with non-metallic elements—sperrylite and laurite.

Sperrylite.—Arsenide of platinum ($PtAs_2$) with a little antimony and rhodium. Isometric, the octahedron and cube being commonest; the pentagonal dodecahedron, the rhombic dodecahedron, and the diploid are known (see Pl. I, *C*). Hardness, 6 to 7. Sp. gr., 10.6. Luster, metallic. Color, tin-white, streak black. If slowly roasted in the open tube sperrylite gives a sublimate of arsenic trioxide and melts easily. Sperrylite is a very rare mineral and until recently has been known from only two localities—western Ontario and North Carolina. Within the last year, however, investigations of the copper ores of the Rambler mine, Wyoming, by Professors Wells and Penfield, have shown minute crystals of sperrylite in the covellite which forms a considerable part of the oxidized zone of the mine. The platinum which has occasionally been found by assay in other ores may have been present as sperrylite.

Laurite is an extremely rare sulphide of ruthenium with a minor amount of osmium. Isometric, in small cubo-octahedrons. Hardness, above 7. Sp. gr., 6.99. Luster, metallic. Color, dark iron-black; powder, dark gray. Brittle. Known only from the platinum washings of Borneo.

CHEMICAL COMPOSITION OF NATIVE PLATINUM AND IRIDOSMINE.

In the accompanying table have been collected analyses of 42 samples of platinum and 2 of platiniridium. They are arranged in order from those highest in platinum to those lowest. "I-O" stands for iridosmine. In the diagram, fig. 1, a series of curves has been plotted, the percentages of platinum in the above analyses being used as abscissas. The percentages of the other metals are used as ordinates. Inasmuch as no definite chemical relation exists among the members of the alloys, the percentages rather than the molecular proportions have been employed. More or less of iridium and of osmium in some of the analyses is involved in the contained iridosmine. In a few cases, however, the two metals have been determined and the presumption is that they were not combined in this individual mineral. Iridosmine is a very insoluble substance and is sometimes left as a residue during the solution of a nugget. Nearly all the percentages of osmium which are recorded indicate loss rather than actual determinations of the pure metal, although this has formed much the greater part of such reported losses. In summary, it may be said that the analyses have been based upon samples from the following localities:

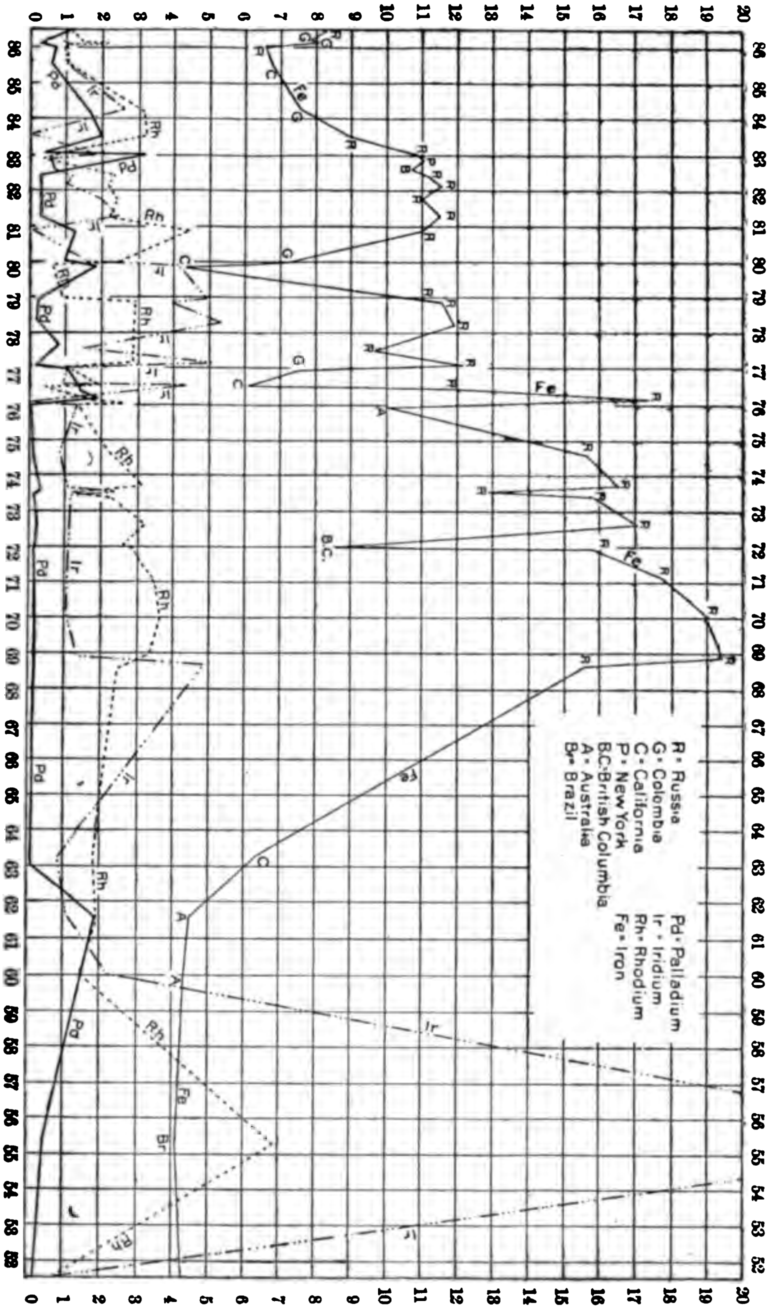


FIG. 1.—Diagram illustrating the chemical composition of native platinum.

Russia, 27; United States of Colombia, 5; California, 4; Australia, 3; New York, 1; British Columbia, 1; Oregon, 1; Brazil, 1.

Table of analyses of platinum nuggets.

	1. Russia.	2. Colombia.	3. Colombia.	4. Russia.	5. California.	6. Colombia.	7. Russia.	8. Russia.	9. New York.	10. Borneo.	11. Russia.
Pt	86.50	86.20	86.16	85.97	85.50	84.34	83.49	83.07	82.81	82.60	82.46
Ir	....	.85	1.09	.98	1.05	2.52	Tr.	1.91	.62	.66	1.21
Rh	1.15	1.40	2.16	.96	1.00	3.13	3.17	.59	.28	....	2.35
Pd	1.10	.50	.35	.75	.60	1.66	1.94	.26	3.10	....	.23
Os	1.08	....	.97	.54	....	.19	....	....	....	....	Tr.
Ru	....	....	....	....	....	....	....	....	....	....	....
I-O	1.40	.95	1.19	2.10	1.10	1.56	....	1.80	....	3.80	....
Au	....	1.00	....	....	.80	....	....	....	....	.20	....
Insol	....	....	....	....	....	....	.93	....	....	....	1.38
Fe	8.32	7.80	8.03	6.54	6.75	7.52	8.98	10.79	11.04	10.67	11.23
Cu	.45	.60	.40	.86	1.40	Tr.	....	1.30	.39	.13	.64
Sand	....	.95	....	....	2.95	....	....	....	....	....	....
Mn	....	....	.10	....	....	.31	....	....	....	....	....
Loss	....	....	....	....	....	....	1.49	....	....	....	.50
Total	100.00	100.25	101.17	98.70	101.15	101.23	100.00	99.72	....	98.36	100.00

	12. Russia.	13. Russia.	14. Russia.	15. Russia.	16. Colombia.	17. California.	18. Russia.	19. Russia.	20. Russia.	21. Russia.	22. Russia.
Pt	82.16	81.72	81.34	80.87	80.00	79.85	78.94	78.92	78.38	77.50	77.14
Ir	1.00	1.81	2.42	.06	1.55	4.20	4.97	3.97	5.32	1.45	5.10
Rh	2.19	2.44	2.14	4.44	2.50	.65	.86	2.87	2.79	2.80	2.74
Pd	.25	.30	.30	1.30	1.00	1.95	.28	.24	.17	.85	.22
Os	Tr.	Tr.	Tr.	....	....	.05	1.25	Tr.	Tr.	2.30	Tr.
Ru	....	....	....	....	....	....	....	....	....	....	....
I-O	....	....	....	.11	1.40	4.95	1.96	....	....	2.35	....
Au	....	....	....	....	1.50	.55	....	....	....	....	....
Insol	1.89	1.04	.57	....	....	....	....	1.09	.32	....	.98
Fe	11.50	10.94	11.48	10.92	7.20	4.45	11.04	11.52	11.72	9.60	12.13
Cu	.21	.95	1.13	2.30	.65	.75	.70	.25	.28	2.15	.34
Sand	....	....	....	....	4.35	2.60	....	....	....	1.00	....
Mn	....	....	....	....	....	....	....	....	....	....	....
Loss	.80	.80	.62	....	....	....	....	1.44	1.02	....	1.35
Total	100.00	100.00	100.00	100.00	100.15	100.00	100.00	100.00	100.00	100.00	100.00

Table of analyses of platinum nuggets—Continued.

	23. Colombia.	24. California.	25. Russia.	26. Russia.	27. New South Wales.	28. Russia.	29. Russia.	30. Russia.	31. Russia.	32. Russia.	33. British Columbia.
Pt	76.82	76.50	76.40	76.22	75.90	74.67	73.70	73.58	73.42	72.61	72.07
Ir	1.18	.85	4.30	Tr.	1.30	.83	1.15	2.35	1.12	1.14	1.14
Rh	1.22	1.95	.30	2.50	1.30	2.26	3.12	1.15	2.30	3.10	2.57
Pd	1.14	1.30	1.40	1.87	Tr.	.18	.23	.30	.15	.23	.19
Os	......	1.25	......	Tr.	......	Tr.	Tr.	2.14	Tr.	Tr.	......
Ru	......	......	......	......	......	......	......	......	......	......	......
I-O	7.98	7.55	.50	......	9.30	......	......	2.30	......	......	10.51
Au	1.22	1.20	.40	......	......	......	......	......	......	......	......
Insol	......	......	......	.50	......	2.30	2.56	......	2.62	3.53	......
Fe	7.43	6.10	11.70	17.30	10.15	15.54	16.65	12.98	15.88	17.13	8.59
Cu	.88	1.25	4.10	.36	.41	1.98	1.47	5.20	2.01	.32	3.39
Sand	2.41	1.50	1.40	......	1.22	......	......	......	......	......	1.60
Mn	......	......	......	......	......	......	......	......	......	......	......
Loss	......	......	......	1.25	......	2.24	1.12	......	2.50	1.94	......
Total	100.28	99.45	100.50	100.00	99.48	100.00	100.00	100.00	100.00	100.00	100.15

	34. Russia.	35. Russia.	36. Russia.	37. Russia.	38. Russia.	39. California.	40. Australia.	41. Australia.	42. Brazil.	43. Oregon.	44. Russia.
Pt	71.94	71.20	70.15	68.95	68.72	63.30	61.40	59.80	55.44	51.45	19.64
Ir	1.18	1.15	1.03	1.34	4.73	.70	1.10	2.20	27.79	.40	76.80
Rh	2.76	3.46	3.61	3.30	2.48	1.80	1.85	1.50	6.86	.65	......
Pd	.14	.18	.20	.21	.20	.10	1.80	1.50	.49	.15	.89
Os	Tr.	Tr.	Tr.	Tr.	Tr.	......	......	.80	Tr.	......	......
Ru	......	......	......	......	......	......	......	......	......	......	......
I-O	......	......	......	......	6.36	22.55	26.00	25.00	......	37.30	......
Au	......	......	......	......	......	.30	1.20	2.40	......	.85	......
Insol	2.87	3.85	3.87	3.75	......	......	......	......	......	......	......
Fe	15.79	17.73	18.90	18.93	15.58	6.40	4.55	4.30	4.14	4.30	......
Cu	3.72	.50	1.16	1.59	.30	4.25	1.10	1.10	3.30	2.15	1.78
Sand	......	......	......	......	......	......	1.20	1.20	......	3.00	......
Mn	......	......	......	......	......	......	......	......	......	......	......
Loss	1.60	1.93	1.08	1.93	1.63	......	......	......	......	......	......
Total	100.00	100.00	100.00	100.00	100.00	99.40	100.20	100.00	98.02	100.25	99.11

NOTES TO TABLE.

1. Russia, Goroblagodat. Berzelius. Köng. Vet. Acad Handl., Stockholm, 1828, p. 113.
2. Colombia, El Choco Deville and Debray. Ann. Chem. Phys., III, Vol. LVI, p. 449.
3. Colombia, El Choco. L. F. Svanberg. Handl. Vet. Acad., Stockholm, 1834, 34. Poggendorff's Annalen, Vol. XXXVI, 1835, p. 471.
4. Russia, Kuschwinsk. Goroblagodat. C. Claus, in Rammelsberg's Handbuch der Mineralchemie, 1860, p. 10.
5. California. Deville and Debray. As under 2.
6. Colombia, El Choco. L. F. Svanberg. As under 3.
7. Russia. Goroblagodat. Nonmagnetic. Minchin, in Kokscharow's Beiträge zur Mineralogie Russlands, Vol. V p. 184.
8. Russia, Nijni Tagilsk. G. Osann. Poggendorff's Annalen, Vol. XIV, 1829, p. 158.
9. New York, Plattsburg. P. Collier. Am. Jour. Sci., Feb. 1881, p. 124.
10. Borneo. M. Bocking. Liebig's Annalen, Vol. XCVI, 1855, p. 243. Two other analyses not in this table will be found under Borneo.

11. Russia. Nijni Tagilsk. Minchin. As under 7.
12. Russia. Idem.
13. Russia. Idem.
14. Russia Idem.
15. Russia. G. Osann. As under 8.
16. Colombia, El Choco. Deville and Debray. As under 2.
17. California. Deville and Debray. As under 2.
18. Russia, Nijni Tagilsk. Berzelius. As under 1.
19. Russia Nijni Tagilsk. Minchin. As under 7.
20. Russia. Idem.
21. Russia. Deville and Debray. As under 2.
22. Russia, Nijni Tagilsk. Minchin. As under 7.
23. Colombia, El Choco. Deville and Debray. As under 2.
24. California, Deville and Debray. As under 2.
25. Russia. Idem.
26. Russia. Goroblagodat. Minchin. As under 7.
27. New South Wales, Fifield. J. C. H. Mingaye. Records Geol. Survey, New South Wales, Vol. V, 1896 1898, p. 35.
28. Russia, Nijni Tagilsk. Minchin. As under 7.
29 Russia. Idem.
30. Russia, Nijni Tagilsk. Berzelius. As under 1.
31. Russia, Nijni Tagilsk. Minchin. As under 7.
32. Russia. Idem.
33. British Columbia, Tulameen River. G. C. Hoffman. Geol. Survey of Canada, II, 1886. Rep. I.
34. Russia. Nijni Tagilsk. Minchin. As under 7.
35. Russia. Idem.
36. Russia. Idem.
37. Russia. Idem.
38. Russia. Idem.
39. California. Kromayer. Archiv. Pharmacie, II, Vol. CX, p. 14. Jahresber. Chem. 1862, p. 707.
40. Australia (New South Wales?). Deville and Debray. As under 2.
41. Australia. Idem.
42. Brazil. L. F. Svanberg. As under 3.
43. Oregon. Deville and Debray. As under 2.
44. Russia. Nijni Tagilsk, Platiniridium. L. F. Svanberg. As under 3.

PERCENTAGE OF VARIOUS METALS CONTAINED IN SAMPLES ANALYZED.

When the analyses are studied it is evident that the platinum from certain localities has a characteristic chemical composition.

Platinum.—The platinum varies from 86.50 to 51.45 per cent for platinum proper. One sample of platiniridium has 19.64 and another has 55.44 per cent. Sixteen of the analyses contain 80 per cent platinum and above, twenty are between 70 and 80 per cent, and six are below 70 per cent, exclusive of the platiniridium. In the analyses of samples whose platinum falls below 63 per cent iridosmine is present in such amounts as to be the chief cause of the low percentage.

Iridium.—Iridium varies from a trace to a maximum of 5.32 per cent (No. 20), but of course it rises much higher in platiniridium. In No. 44, which is based on the latter mineral, it reads 76.80 per cent. In those analyses which have recorded percentages of iridosmine the total iridium would be higher if the specimens had been considered commercial samples, but, as has been stated, the iridosmine is probably a mechanical inclusion. The amount of the combined iridium seems to have no definite relation with the platinum.

Rhodium.—Rhodium is not recorded in the sample from Borneo (No. 10), but it does appear in all the others. Its minimum percentage is 0.28 in No. 9, the sample coming from New York. Its maximum is 4.44 in No. 15, a Russian specii platiniridium (No. 42) it reads 6.86. When the curve of the rhodium is plotted it exhibits some points of similarity with that of iridium, but there are so many other marked contrasts that one can not trace a definite relation between them.

Palladium.—Palladium is not recorded from Borneo, but it is invariably mentioned in all the other analyses. It ranges from a trace as a minimum to 1.95 per cent in No. 17, a California specimen, as a maximum.

Osmium.—Osmium is not often specifically determined. As already stated, most of the figures cited as osmium mean simply loss. We can only say that it is usually present, but that, aside from inclusions of iridosmine, it is in small quantity.

Ruthenium.—Ruthenium is not recorded in any analysis of platinum or platiniridium, but it does appear in iridosmine, as is shown by the second table of analyses.

Iridosmine.—Iridosmine mechanically involved may be present in large amounts. Almost all the analyses show some, and the amount ranges from 0.11 as a minimum to 37.30 as a maximum. In platinum from North America and Australia it is more abundant than in the samples from Russia. The maximum of 37.30 was found in a sample from Oregon. It will be of interest to insert at this point a series of analyses of iridosmine itself, because they throw light upon the composition of this mineral as included in native platinum.

Analyses of iridosmine.

	1. Russia.	2. Colombia.	3. Russia.	4. Russia.	5. Borneo.	6. Australia.	7. Colombia.	8. Russia.	9. California.	10. Russia.	11. Russia.	12. Russia.
Ir	77.20	70.40	70.36	64.50	58.27	58.13	57.80	55.24	53.50	46.77	43.94	43.28
Os	21	17.20	23.01	29.90	38.94	33.46	35.10	27.32	43.40	49.34	48.85	40.11
Pt	1.10	.10	.41	2.80	.15	......	......	10.06	......	......	.14	.62
Rh	.50	12.30	4.72	7.50	2.64	3.04	.63	1.50	2.60	3.15	1.65	5.73
Pd	......	......	......	......	......	......	......	Tr.	......	......	......	......
Ru	.20	......	......	......	......	5.22	6.37	......	.50	......	4.68	8.49
Au	......	......	......	......	......	......	......	......	......	......	......	......
Fe	......	......	1.29	1.40	......	......	.10	Tr.	......	.74	.63	.99
Cu	Tr.	......	.21	.90	......	.15	.06	Tr.	......	......	.11	.78
Total	100	100	100	100	100	100	100.06	100	100	100	100	100

NOTES TO TABLE.

1. **Russia.** Deville and Debray. Annales Chem. et Phys., III, Vol. LVI, p. 449.
2. **Colombia. El Choco.** Idem.
3. **Russia.** Idem. Sp. gr. 20.5.
4. **Russia.** Idem. Sp. gr. 18.8.
5. **Borneo.** Idem.
6. **Australia, undoubtedly** New South Wales and from the Richmond or Clarence rivers. Idem.
7. **Colombia, El Choco.** Idem.
8. **Russia. Nijni Tagilsk.** Claus. Beiträge zur Chemie der Platinmetalle. Dorpat, 1854. Jahresber. Chemie, 1855, pp. 423, 444, 814, 905.
9. **California.** Deville and Debray. As under 1.
10. **Russia.** Berzelius, Poggendorff's Annalen, Vol. XXXII, 1833, p. 232. Sp. gr. 19.386–19.471, Ir. Os.
11. **Russia.** Deville and Debray. As under 1. Sp. gr. 20.4.
12. **Russia.** Idem. Sp. gr. 18.9.

The table of analyses brings out very clearly the fact that platinum is extremely subordinate in iridosmine, and may entirely fail. It varies from nothing through a general amount of less than 1 to 10.08 in No. 8, a Russian sample, as a maximum. The iridium varies from 43.28 as a minimum to 77.20 as a maximum. The osmium ranges from 49.34 as a maximum to 17.20 as a minimum. These extreme values do not correspond exactly to the minimum and maximum values of iridium, but it may be stated that in general the low values of osmium accompany high values of iridium, and vice versa. Rhodium is present without exception, and reaches in No. 2, from Colombia, 12.30, as a maximum. These values are pretty well distributed between this amount and 0.50 as a minimum. Palladium, which is universally present in platinum, practically fails in iridosmine, while ruthenium, which fails in platinum, may be present in considerable amounts in iridosmine. No. 12, from Russia, contains 8.49 per cent. Gold fails entirely, and iron and copper are either entirely lacking or insignificant.

Gold.—Gold is frequent in samples from California and Colombia, but in almost all cases it seems to fail in Russian material. When present, it varies from a minimum of 0.20, in No. 10, from Borneo, to 1.50, in No. 16, from Colombia. Presumably, the gold cited in the analyses appears as an alloy, but gold is also known mechanically included with, or plated or welded upon the platinum, as will be more fully described under the minerals which are associated with the nuggets.

Iron.—Iron is mentioned in all the analyses except No. 44, of a Russian sample of platiniridium. In platinum proper its minimum is 4.30, in No. 43, from Oregon. This low percentage is accompanied by a high percentage of iridosmine—37.30. Another sample, No. 41, from Australia, likewise contains but 4.30 of iron; and it has 25 per cent iridosmine. The maximum values in iron are present in the samples with moderate percentages of platinum—69 to 76. The highest figure recorded is 18.93, No. 37, from Russia. As the amount of platinum increases, the iron tends to decrease, but the statements are based chiefly upon Russian material. The curve of iron in the diagram (fig. 1) is very significant. We need, however, for its true estimation, to bear in mind the geographical localities. If one fixes attention upon the Russian samples, whose points are marked with an R, it is evident that the iron increases quite regularly and uniformly from the richest nugget, with 86.50 platinum, to the one with 68.95. Nearly all the points which have been plotted below this curve are based upon analyses from other localities. The iron in the specimens from Colombia is quite uniform, standing in nearly all cases between 7 and 8 per cent. The California samples likewise have comparatively small amounts.

Copper.—Copper was absent or undetermined in No. 7, from Russia,

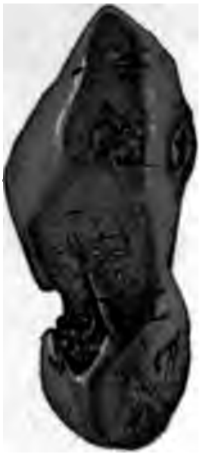
PLATE II.

PLATE II.

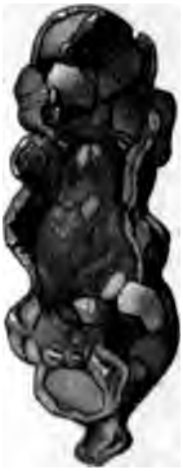
(*A*) Nugget of platinum, gold, and chromite, Colombia. × 20 diam.

(*B*) Nugget of platinum, gold, and dolomite or magnesite, Colombia. × diam.

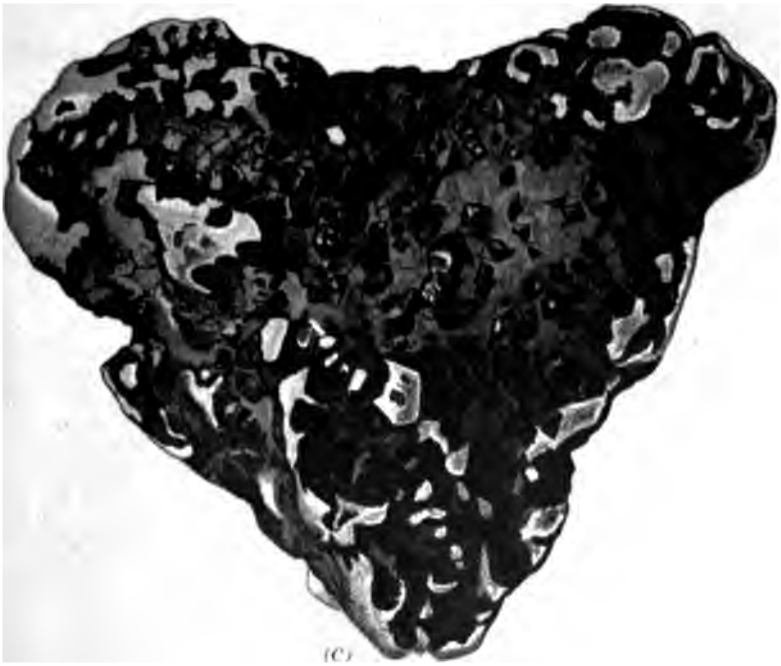
(*C*) Platinum nugget with olivine and octahedral chromite, Tulameen distri British Columbia. × 9 diam.



(A)



(B)



(C)

[illegible]

but it is otherwise invariably present. It ranges from a trace in No. 6, from Colombia, to a maximum of 5.20 in No. 30, from Russia. It is usually less than 1 per cent, although, in looking through the table, a considerable number of analyses will be found above this figure.

Other metals.—Manganese has been recorded in two cases, Nos. 3 and 6, both from Colombia. The amounts, however, are small—0.10 and 0.31, respectively. It probably appears in much the same relation as iron. Lead has been recorded in one from Fifield, New South Wales, but only traces are mentioned. This is No. 27, although the lead is not given in the table. In No. 24, from California, 0.55 per cent lead is mentioned in the original citation with a query. Quicksilver has been recorded in one from California. It is No. 39, and 0.60 per cent is given in the original. Nickel has been reported in platinum from Nijni Tagilsk, by Terreil. In a sample containing 8.18 Fe, 0.75 Ni was determined.[a]

MINERALS ASSOCIATED WITH THE NUGGETS.

It is necessary to discriminate between the minerals which actually form a part of the nuggets and those which are merely associated with them as components of the gravels. Under the former head chromite, olivine, serpentine, pyroxene, mica, and gold have now been discovered.

Chromite.—Chromite is much the commonest of all the foreign minerals which are found attached to the nuggets. Its general relations with the platinum are illustrated by Pl. II, *A*, *B*, and *C*, and Pl. III, *A* and *B*. The nuggets from which the drawings of Pl. III were made came from British Columbia. Those from which Pl. II was prepared are from Russia, Colombia, and British Columbia. The platinum is intermingled with the chromite in such a way that sometimes one mineral and sometimes the other is the host, and there seems to be no question that the two minerals have crystallized together. Sometimes the chromite appears as little octahedrons perched upon the platinum. These are illustrated in Pl. II, *C*, a specimen from British Columbia. The British Columbia nuggets which contain platinum sometimes have a crumbly aspect, suggesting that the grains of chromite are held together by the platinum and have not traveled far. Nuggets with chromite have been observed in Colombia, Russia, British Columbia, and at Plattsburg, N. Y. Nevertheless, nuggets with attached chromite are not particularly common and appear as a small minority in the commercial samples. The chromite is always suggestive of a basic igneous rock as the source from which the nuggets have been derived.

Olivine.—Olivine has been discovered upon a few nuggets from British Columbia. The illustration, Pl. III, *B*, has been drawn from one of a number of thin sections which have been prepared by the writer.

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[a] Comptes rendus, Vol. LXXXII, 1876, p. 1116.

The olivine seems quite abundant upon the fresh nuggets, but when the thin sections are cut it is discovered that the core is platinum and that merely an outside shell of olivine grains adheres to it. The latter grind off with the greatest facility, so that it is very difficult to preserve them for microscopic examination. These attached olivines suggest in the strongest manner a peridotite as the source of the nuggets. Serpentine, quite certainly derived from olivine, has been observed upon a number of Russian specimens and is likewise suggestive of basic igneous rocks as the source of the metal.

Pyroxene.—Upon one thin section of a nugget from British Columbia adhering crystals of pyroxene have been discovered by the writer. They are illustrated by Pl. III, *C.* The pyroxene appears to be common augite. It possesses the usual high extinction angle and the other normal optical properties. Pyroxenites occur near the place of discovery of the nugget, and have probably been the mother rock.

Mica.—Kokscharow has recorded one instance in the Urals in which a platinum scale was found embedded in a mica crystal.[a]

Gold.—Gold has been mentioned in connection with the analysis of platinum, and the remark was there made that the yellow metal was probably alloyed with the platinum in the cases cited. It does, however, occur either mechanically involved with the platinum or plated or welded to it, and in searching over a number of nuggets several have been found in which the gold formed an auxiliary mineral. They have been obtained chiefly from Colombian samples, and two small ones have been selected for illustration, as shown by Pl. II, *A* and *B.* Pl. II, *B*, is of special interest, as it shows gold, platinum, and dolomite or magnesite on the same piece. The white mineral effervesces feebly with warm nitric acid. A number of others, which are small, have, however, likewise been studied. Some were obtained in British Columbia and some in Russia.

So far as known to the writer, no other minerals have been actually found forming a part of the nuggets except iridosmine. It is possible that magnetite may at times have been taken for chromite. The rusty crust on some nuggets may be a mineral not mentioned above.

Associated minerals in the gravels.—Minerals associated with the platinum nuggets are the familiar ones which have been so frequently studied in connection with the much more abundant gold-bearing placers. The commonest ones are gold, silver, copper, iridosmine, and other members of the platinum group, chromite, magnetite, menaccanite, garnet, zircon, rutile, small diamonds, topaz, quartz, cassiterite, pyrite, and epidote. Almost any mineral of high specific gravity which is commonly met in rocks may be expected to appear in the pannings. Purchasers of platinum dust also occasionally meet bits of lead, which appear to be shot that have been fired from a gun. It is possible that they have gotten into the gravels after having been used by some hunter. It is at least charitable to attribute this source to the lead.

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[a] Materialen zur Mineralogie Russlands, Vol. V

PLATE III.

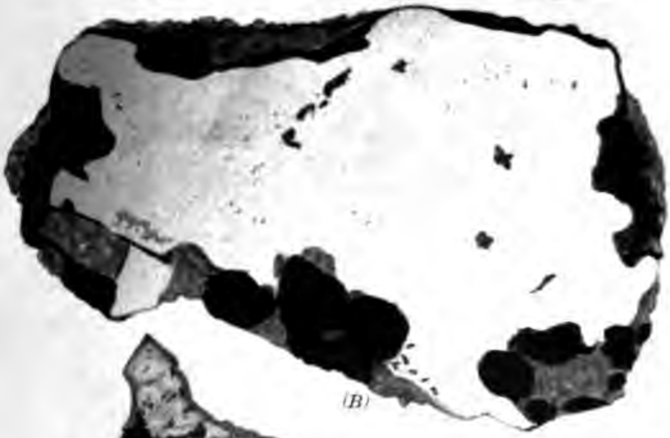
PLATE III.

(*A*) Polished nugget of platinum and chromite, Tulameen River, British Columbia. × 10 diam.

(*B*) Thin section of nugget of platinum, chromite, and olivine, Tulameen River. × 14 diam.

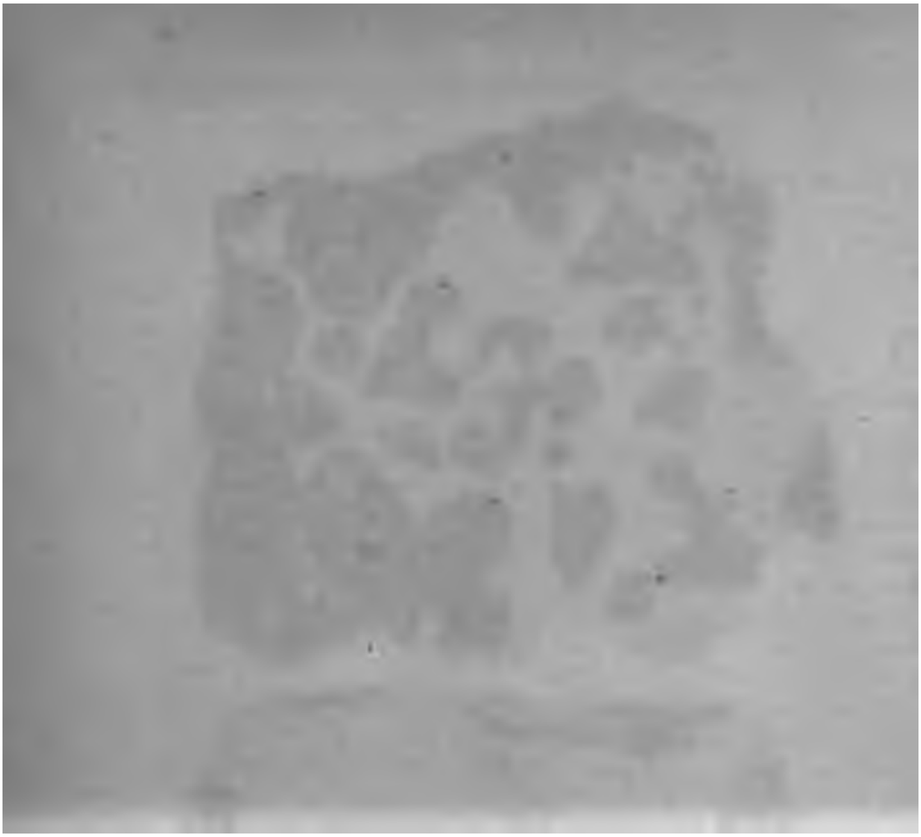
(*C*) Thin section of nugget of platinum and pyroxene, Tulameen River. × 15 diam.

(A)



(B)

(C)



PLATINUM IN COUNTRY ROCK.

The greatest interest has been felt by all familiar with the subject in the discovery of platinum in the mother rock, and a number of observers have endeavored to trace the nuggets back to their sources. In four or five cases this has been accomplished.

Urals.—The first person to succeed, or to believe that he succeeded, was Dr. Moritz von Engelhardt, who was professor of mineralogy in the University of Dorpat. In the early part of the preceding century it seems to have been a not infrequent custom among several of the European governments to commission a scientific man to travel with a view to investigating the mineralogical resources of some particular region. Gustav Rose's famous trip through the Urals and the Altai Mountains may be cited as an example. In a somewhat similar way Professor von Engelhardt was sent in 1826 by his university to trace, if possible, the gold and platinum of the Urals to their sources. His results were published in a small pamphlet of 44 pages, in Riga, in 1828.[a] Professor von Engelhardt studied the gold and platinum at Nijni Tagilsk and at Nijni Turinsk. On his return from Nijni Turinsk to Nijni Tagilsk he discovered, near the village of Laja and upon the bank of a neighboring brook, weathered porphyritic rocks which furnished superficial deposits very similar to those in the platinum mines at Nijni Turinsk. Although they were deeply weathered, he was able finally to secure some specimens of fresh material. In his description he states that they exhibited a part that resembled greenstone and a part like syenite, consisting of hornblende and reddish white feldspar, with some imperfect crystals and rounded nests of individual feldspar. The outer surfaces of the bowlders and of the cracks were coated with brown ocher and black oxide of manganese, but toward the center the feldspar crystals became white and kaolinized. The larger nests of feldspar seemed like spheroids of feldspar-porphyry. The remaining finely crystalline base was a mixture of hornblende and feldspar and was brown and stained with iron. The binding material of the bowlders was feeble. It resembled brown jasper, or brown clay ironstone, and appeared in rounded grains and angular bits.

In places the rock was entirely black and full of fine pores. The outer portion could be knocked off in curving shells, so that the observer might imagine that he had a slag before him if it were not that the core made it possible for him to recognize the porphyry. By a careful examination of these specimens Professor von Engelhardt was enabled with a lens to discover in the fresh porphyry shining metallic points resembling the platinum which was washed from the sands at Nijni Turinsk. These were submitted to a very careful chemical investigation by his colleague, Professor Osann, who separated a pair of the little grains and identified them as platinum. The granules obtained from the "syenitic greenstone porphyry" were rounded, with little elevations and depressions. The depressions were largely stained black, while the elevations were tin white and strongly metallic. A few little grains, which were a mixture of gold and platinum, possessed a grayish yellow color. Each platinum grain was inclosed in limonite or brown ocher, which also coated the small pores even of the fresh rock. Dr. Engelhardt states that probably the numerous, larger pores of the weathered porphyry had likewise contained grains of platinum, which were freed when the rock fell to pieces.[a] This discovery is extremely interesting, because it indicates the presence of platinum in a feldspathic rock and not in a peridotite or serpentine, or in an especially basic type. In this connection a comparison with the results obtained by the writer in British Columbia will be of interest.

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[a] This little work is not easily accessible in America, but a copy is now in the possession of the writer.

A few years after Professor von Engelhardt made his discovery, Gustav Rose visited Dorpat in connection with his famous trip through the Urals. Rose records his great desire to discover platinum in the country rock and the interest which he felt in Dr. Engelhardt's investigations. He visited the locality and had no difficulty in collecting similar samples of rock, and, on his return through Dorpat he procured additional material from the same lot upon which Dr. Engelhardt had made his determinations. Rose was, however, unable to verify Engelhardt's discoveries and found no platinum in any specimen of the rock.[b] These results would indicate that the platinum is sparsely and irregularly distributed, an experience which has been met by others. Professor von Engelhardt's observations are so well fortified by chemical tests on the part of his colleague, Professor Osann, that one would hesitate to question them.

Interest has been felt by geologists everywhere in the announcement that platinum had been again discovered within the last few years in the country rock of the Urals, but as the published descriptions have been in Russian they are not easily accessible to English-speaking people. In the sketch of platinum in Russia which is subsequently given, a translation of the most important paper will be found. In this place it will be merely remarked that in a paper by Prof. A. Inostranzeff, read before the St. Petersburg Society of Naturalists in 1892, and entitled Primary Deposits of Platinum in the Urals, a description is given of the most recent discovery. Daubrée had identified platinum by assay in bowlders of peridotite from the vicinity of Nijni Tagilsk in 1876. In the summer of 1892 Professor Inostranzeff visited this district and recognized the fact that the gravels containing the platinum had been derived from Soloviev Mountain, which was known to consist chiefly of serpentine and peridotites. About that time the story spread that a laborer had been seen mining by himself. When he was finally located it was found that he had blasted into the rock of the mountain and had followed up a pocket some 35 cm. in diameter. The rock which had been mined appears to be an altered olivine rock which has passed even beyond the stage of serpentine. It consists of chromic iron, serpentine, and dolomite, and seems to be somewhat shattered, because its pieces are cemented together by opaline silica. When this shattered and more or less decomposed rock was crushed and panned it yielded colors of platinum of an exceedingly fine character, but they were distinctly recognized. On assay of 500 grams of the crushed rock, taken in several samples, platinum was found to be present to an amount of 0.0107 per cent, or about 3 ounces to the ton. This platinum contained no iridium.

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[a] Die Lagerstätte des Goldes und Platin im Ural-Gebirge, by Moritz von Engelhardt, Riga, 1828, pp. 30-31.

[b] Reise nach dem Ural, etc., by Gustav Rose, Vol. 1, p. 340.

There is record of the presence of platinum in the gold-bearing quartz veins at Beresovsk, Russia.[a]

Colombia.—As early as 1826 Boussingault announced in a letter to Humboldt that he had obtained scales of platinum upon panning the ferruginous outcrop of a vein which occurred at Santa Rosa, near Medellin, province of Antioquia, Colombia. Further details are given in the subsequent description of platinum in Colombia. By a misunderstanding of the records this locality is sometimes mentioned as being in Brazil, as, for example, in Dana's Mineralogy.

Mexico.—In 1875 Sandberger announced that he had detected platinum in some pseudomorphs of limonite after pyrite from an unrecorded locality in Mexico.[b]

Brazil.—In various papers on platinum the statement has been recorded that the metal has been discovered in place in Brazil. C. F. Hartt states, on page 448 of his Geology and Physical Geography of Brazil, that platinum is found in quartz veins which cut syenitic gneiss. The veins are called the Boa-Esperança. Hartt also states, on page 542, that the gold of Gongo Seco, in the province of Minas Geraes, contains palladium, and in a footnote he states further that the gold of Brazil is always alloyed with silver and occasionally with platinum, and that it may contain iron. Iridium and iridosmine are found in the gold washings of Minas.

NOTE.—Since this bulletin was written, the writer, with the cooperation of Dr. David T. Day and Mr. A. W. Johnston, has accumulated proof of the presence of platinum in pyrite and in quartz veins from several American localities. The notes are in preparation for publication.

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[a] Phillips's Ore Deposits, 2d edition, pp. 545-546.

[b] Neues Jahrbuch, 1875, p. 625.

Platinum was observed and reported to be a constituent of copper ores very early in the nineteenth century. In the series of samples of tetrahedrite, or some mineral resembling it, which was sent from Guadalcanal, Spain, to Paris in 1806, the French chemist Vauquelin discovered platinum in amounts varying from a trace to as much as 10 per cent. The ore came from veins, and the platinum no doubt was found in place. Additional details are given regarding the local geology in the notes upon platinum in Spain.[a]

France.—Berthier and Becquerel have detected it in limonite from the departments of Charente and Deux Sevres, France.[b]

A very interesting case of the occurrence of platinum in tetrahedrite and in bournonite in certain limestones of the western Alps has been described by E. Gueymard,[c] a French mining engineer, long a resident of the region. The platinum varied from nothing to amounts that could be weighed. The majority of the samples, however, failed to afford it. (Details are subsequently given under "France," p. 65.) The occurrence is of great interest, and, taken together with the results of Vauquelin and the known presence of platinum in the nickel-copper ores of Sudbury, makes it desirable to scrutinize this type of ore with great care. It is quite possible that in the past small amounts of platinum have been overlooked, which, with modern electrolytic methods of separation, could be profitably obtained, and there is reason to believe that occurrences of this sort are more promising for economic treatment than are those of native platinum sparsely distributed in otherwise barren rock. The failure of platinum to amalgamate makes its metallurgical recovery much more difficult than that of gold, and its extraction through the medium of copper furnishes one of the most promising lines of attack.[d]

Germany.—In this connection it is interesting to note its detection by Maximilian, Duke of Leuchtenberg, in 1847, in the black sand which remained at the anode when copper sulphate was electrolytically treated.[e] Platinum has been discovered in amounts that admitted of separation in old silver coins which circulated in Germany and which had derived their silver from silver-copper ores.[f]

H. Rössler has described the methods of separating the platinum from the silver which was obtained from the mines at Commern and Mechernich. These famous ore bodies consist of beds of Lower Triassic sandstone, which are impregnated with nodules of galena or cerussite, and more rarely of copper carbonate. While the silver was probably derived from the galena, and while the platinum may have come from the same source, yet the subordinate presence of copper casts a little uncertainty over the original association of the platinum as between it and the lead.[a]

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[a] Vauquelin, Annales de Chemie, Vol. LX, 1806, p. 317. Journal für die Chemie, Physik und Mineralogie, Vol. II, 4, 1806, p. 694. Leonhard's Jahrbuch, Vol. II, p. 311.

[b] Poggendorff's Annalen, Vol. XXXI, 1834, p. 590.

[c] Comptes rendus, Vol. XXIX, 1847, p. 814.

[d] It is interesting to observe that eight months after this paragraph was written platinum, in the form of included sperrylite, was announced in the ore of the Rambler Copper Mine, Wyoming (W. C. Knight, Eng. and Min. Jour., Dec. 28, 1901, p. 845; Wells and Penfield, Am. Jour. Sci., Feb., 1902, p. 95).

[e] Bull. Acad. Sci. St. Petersburg, Vol. VI, 1848, p. 129. Dingler's Polytech. Journal, Vol. XXXV, 1847, p. 106.

[f] M. Pettenkoffer, Poggendorff's Annalen, Vol. LXXIV, 1848, p. 316.

Platinum in association or combination with galena has been reported several times. Details of such an occurrence in France that could not be verified will be found under "France," p. 65. Another from Algiers has been reported, but further corroboration is desirable.[b] (See p. 82.)

Pennsylvania.—In 1852 Dr. F. A. Genth announced that he had detected platinum in the assay of a clay slate containing pyrite, chalcopyrite, and galena in Lancaster County, Pa. He likewise discovered traces of platinum and silver in ilmenite from a mica-schist in the same place.[c] In later years platinum has been detected by A. W. Johnston in variable but sometimes considerable amounts, of which the details are given later, not far from Boyertown, along the border of Berks and Montgomery counties, Pa. The mother rock is a black Triassic shale. A black dioritic gneiss from eastern Pennsylvania has afforded appreciable assays.

Arizona.—Shales have been brought from Arizona, from some place in the vicinity of the Grand Canyon of the Colorado, which on assay have yielded weighable amounts of platinum. (See under "Arizona," p. 51.)

Ontario.—In 1888 F. L. Sperry noted small, shining, metallic crystals in the concentrates obtained from the Vermillion gold mine, a few miles west of Sudbury, Ontario, which was based upon a quartz vein cutting rusty diorite. When these crystals were investigated by Messrs. Wells and Penfield, of New Haven, they were found to be arsenide of platinum ($PtAs_2$), the first compound of platinum with a nonmetallic substance which has been recognized. They named the mineral "sperrylite," and it has since been discovered in many of the nickel mines of Sudbury. It seems to favor the chalcopyrite rather than the pyrrhotite, but Clarke and Catlett have shown that the sulphide of iron and nickel, polydymite, likewise contains considerable proportions of platinum. These discoveries, therefore, revealed the presence of platinum in place and in association with ores which are usually regarded as of igneous origin, and which are known to occur in basic igneous rocks.[d] Full descriptions, with citations of the literature bearing on the subject, will be found subsequently under "Canada," p. 38.

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[a] H. Rössler, Liebig's Annalen, Vol. CLXXX, 1876, p. 240.

[b] Comptes rendus, Vol. VII, 1838, p. 246.

[c] F. A. Genth, Pharm. Centralblatt, 1852, p. 72.

[d] Microscopic investigations now being made by one of the writer's students, Mr. C. W. Dickson, upon Sudbury ores, cast much doubt upon the igneous origin of the sulphides, and indicate a replacement of ferromagnesian silicates.

Wyoming.—Platinum has been recently reported by W. C. Knight as a constituent of the copper ores, and more particularly of the covellite, of the Rambler copper mines, about 60 miles south of Laramie. Wells and Penfield have detected sperrylite in the covellite.[a]

New South Wales.—In 1889 attention was directed to certain ferruginous materials resembling gossan which outcropped in the vicinity of Broken Hill, in the extreme western portion of New South Wales, Australia. When this ferruginous cap was assayed it was found to contain platinum, even up to several ounces per ton. The cappings are quite widely distributed in the region, and rest upon more or less altered metamorphic rocks, embracing gneisses, quartzites, and schists of Lower Silurian age. Shafts have been sunk to shallow depths, and have revealed the fact that iron greatly diminishes, and clays and kaolin come in, until unaltered rock is encountered. The clays also gave assays for platinum. It is thought by J. B. Jaquet that the iron caps are due to uprising springs, which have likewise introduced the platinum.

North Carolina.—In 1898 it was announced that sperrylite had been discovered in North Carolina as early as 1894 by W. E. Hidden. Later on Messrs. Hidden and Pratt followed up the sperrylite and associated minerals, until they definitely located them in a ledge of rock upon the top of Mason Mountain, Macon County. The rock consists of garnet of the variety rhodolite, and of biotite, together with considerable iron sulphides. Pannings of the surface soil yielded sperrylite.

British Columbia.—In the summer of 1900 A. W. Johnston and the writer succeeded in demonstrating the presence of platinum in the peridotite of the Tulameen River, British Columbia, and in a neighboring granite. In the former the platinum favors asbestiform streaks, which appear to be present along lines of faulting in the peridotite. In the granite the platinum was discovered along a crushed belt which was richly stained with chlorite. More details are subsequently given under "British Columbia" (p. 38).

Résumé.—From this review of the discoveries which have been hitherto made it is evident that platinum is not exclusively limited to the olivine rocks, nor indeed to the igneous rocks and the placers, but that it does appear sometimes in veins with other metals, especially copper. It would follow that the platinum migrates in solution. It or its arsenide probably is soluble in some form of solutions which involves copper. Commercially speaking, however, the amount which has thus far been detected is small.

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[a] W. C. Knight, Eng. and Min. Jour., Dec. 28, 1901; Wells and Penfield, Am. Jour. Sci., Feb., 1902, p. 95.

PLATINUM IN AUSTRALIAN COAL.

A most extraordinary case has been recorded of the presence of the metals of the platinum group in the ash of certain Australian coals (exact locality not mentioned), along with vanadium.[a] The coal, as analyzed by Messrs. Thirkell & Co., of London, yielded the following:

Carbon	65.2	Water at 100° C	0.7
Hydrogen	4.6	Ash	1.7
Oxygen	21.8		
Nitrogen	1.9	Total	99.7
Sulphur	3.8		

The ash yielded the results under No. 1. No. 2 is a second sample.

	No. 1.	No. 2.
Vanadium	25.1	2.90
Platinum metals	3.6	.23
Oxygen with above	44.0	5.10
Sandy and earthy matters	27.3	91.77
Total	100.0	100.00

This means in the original coal a little over 144 troy ounces of vanadium and 20⅔ ounces of the platinum metals per long ton of coal, and makes the coal the richest crude platinum ore yet assayed.[b] No. 2 is an analysis of the ash of the coal in bulk. It implies only an eighth as much vanadium and a fifteenth as much of the platinum metals per ton of coal, if the ash were the same percentage of the coal as before; but its percentage is not given in the citation. The amounts of vanadium and platinum which are given in the citation are over 146 ounces of vanadium and more than 11 ounces of the platinum metals per ton of coal, which, if correct, would imply a high-ash coal.

Coals whose ash is rich in vanadium are known in Argentina and in Peru, but no mention of platinum has been made in connection with them.

PLATINUM IN METEORITES.

In January, 1899, John M. Davidson, of Rochester, N. Y., announced that he had identified platinum in two meteorites. Of the Coahuila meteorite, 608.6 grams were tested and yielded 0.014 gram of platinum. Of this, 0.0015 gram was insoluble and gave indications of iridium. Of the Toluca meteorite, 464 grams afforded a little platinum, with indications of iridium.[c] Palladium was earlier announced in an Italian meteorite.[d]

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[a] Seventeenth Ann. Rept. U. S. Geol. Survey, Part III, p. 282.

[b] This would be 124 ounces of vanadium and 17⅜ ounces of the platinum metals per short ton.

[c] Platinum and iridium in meteoric iron, by John M. Davidson: Am. Jour. Sci., Jan., 1899, p. 4.

[d] G. Troltarelli, Jour. Chemical Society, Vol. LX, 1891, p. 533.

PLATINUM IN THE SUN.

Platinum has been detected by the spectroscope in the sun.[a]

GENERAL PAPERS ON PLATINUM.

Bullman, Charles. The platinum group of metals: The Mineral Industry, Vol. I, 1893, p. 373.

Breithaupt. On the varieties of native platinum: Poggendorff's Annalen, Vol. VIII, 1826, p. 500.

Daubrée, A. Experiences sur l'imitation artificielle du platine natif magnetipolaire: Comptes rendus, Vol. LXXX, 1875, p. 526.

Deville and **Debray**. On the chemistry and metallurgy of the platinum group: Annales Chim. Phys., 3d series, Vol. LVI, p. 449.

Frémy, E. Nouvelles recherches sur les métaux qui accompagnent le platine dans sa mine: Comptes rendus, Vol. XXXVIII, p. 1008. Erdmann's Jour. f. prakt. Chem., Vol. LXII, p. 340.

Howe, James Lewis. Bibliography of the metals of the platinum group: Smithsonian Miscellaneous Collections, No. 1084. Washington, 1897. This is the most complete work of reference on the platinum group of metals.

Miller, E. H. The assay of platinum: School of Mines Quarterly, Vol. XVII, 1895, p. 26.

Vogt, J. H. L. On the processes of crystallization in eruptive rocks: Zeitsch. f. prakt. Geologie, July, 1893, pp. 267-268; October, 1894, p. 397.

REVIEW OF LOCALITIES WHERE METALS OF THE PLATINUM GROUP HAVE BEEN DISCOVERED.

NORTH AMERICA.

CANADA.

QUEBEC.

About the middle of the last century there was considerable interest in the gold-bearing placers which had been discovered along the south bank of the St. Lawrence River in what is known as the Eastern Townships of Quebec. A few minute scales and grains of platinum and iridosmine were noted by T. S. Hunt in the gold of the Rivière du Loup. It is also stated that these minerals are likewise found with the gold of the Rivière des Plantes.[b]

The source of this platinum has not been discovered, but it is well known to geologists that serpentine occurs along the border between Quebec and Vermont and New Hampshire. It is possible, however, that it may lie too far to the west to have furnished the nuggets. The glacial drift, moreover, casts some uncertainty over the exact source. Here reference may be made to the nugget which was found at Plattsburg, N. Y., regarding which a note is subsequently made under New York (p. 57).

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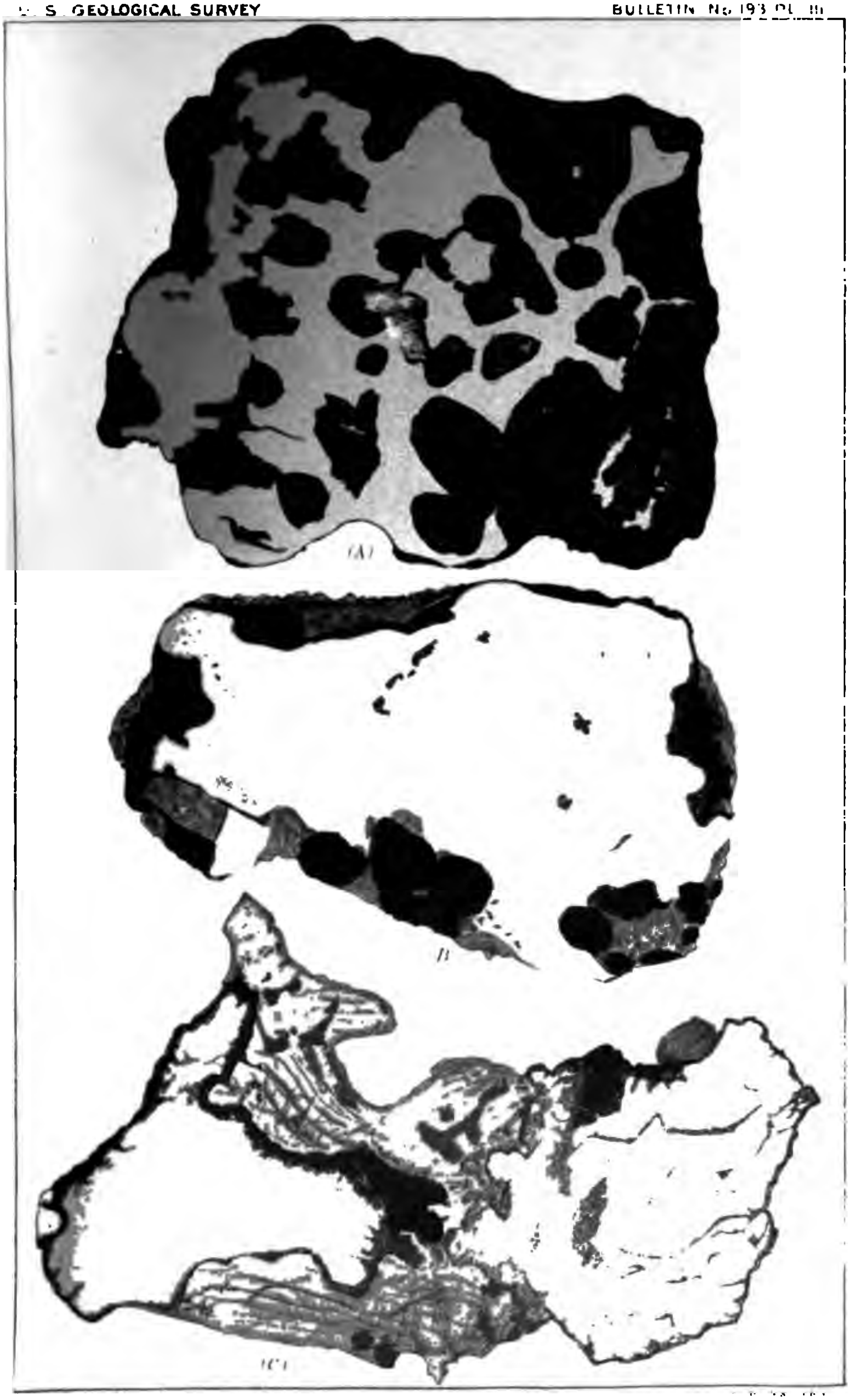
[a] J. N. Lockyer, Proc. Roy. Soc. Lond., Vol. XXVII, 1878, p. 279; Hutchins and Holden, Proc. Am. Acad. Sci., Vol. XXIII, 1887, p. 14; Am. Jour. Sci., Vol. XXXIV, 1887, p. 451.

[b] T. S. Hunt, Geol. Survey Canada, 1851-52, p. 120.


(A)
B
(C)

brought into their present position with the igneous rock in which they occur. As regards the platinum, these views coincide with the belief that in its original home this metal most frequently occurs in association with olivine as a true igneous mineral in the peridotites, even though no olivine has ever been found in the Sudbury norite-diorite. But it is only fair to state that some authorities, notably F. Pošepny and S. F. Emmons, have felt that there were objections to the view that the Sudbury ores were of igneous origin. In the citations below a list of papers bearing upon the platinum is given, and besides these a few others upon the general geology of the nickel-copper ores.[a] For the general geology of the Sudbury district, see the Geological Survey of Canada, New Series, Vol. V, Part I, Report F.

Attention may at this point be directed to the occurrence of sperrylite in North Carolina, which is subsequently described (p. 59).

In connection with a careful chemical and geological investigation of certain magnetic iron ores from eastern Ontario, F. J. Pope made some careful assays for platinum. As certain of these ores were igneous in their origin and were derived from basic rocks, some hope was entertained that traces of platinum might be discovered in them. None, however, were found.[b]

BRITISH COLUMBIA.

Platinum has been obtained in commercial quantities in connection with the gold washings of southwestern British Columbia, and this source has proved to be the most productive of all thus far developed upon the North American Continent. When the California washings began to fall off, the gold seekers penetrated the mountains of the northwest, and much interest was felt in British Columbia as early as 1861. Some prospecting was done on the Similkameen River. The Similkameen forks into two branches at the town of Princeton, which lies about 30 or 40 miles north of the international boundary on the east side of the Cascade Mountains. In the early days these two branches were called the South and North forks, but later the North Fork received the name Tulameen. The gold washings in 1861 and subsequent years were not extensively developed, although from time to time parties of Chinese worked them. Almost from the start it was recognized that platinum occurred with the gold, but not

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[a] Clarke, F. W., and Catlett, Charles. A platiniferous nickel ore from Canada: Bull. U. S. Geol. Survey No. 64, p. 21. Am. Jour. Sci., 3d series, Vol. XXXVII, p. 372.

Emmens, S. H. The Mineral Industry, Vol. I, 1892, p. 377.

Foullon, H. B. von. Ueber einige Nickelerzvorkommen: Jahrbuch d. k. k. geol. Reichsanstalt, 1892, Vol. XLII p. 301.

Garnier, J. Mines du nickel, cuivre, et platine du district de Sudbury: Mémoires de la Société des Ingenieurs Civile, Paris, March, 1891.

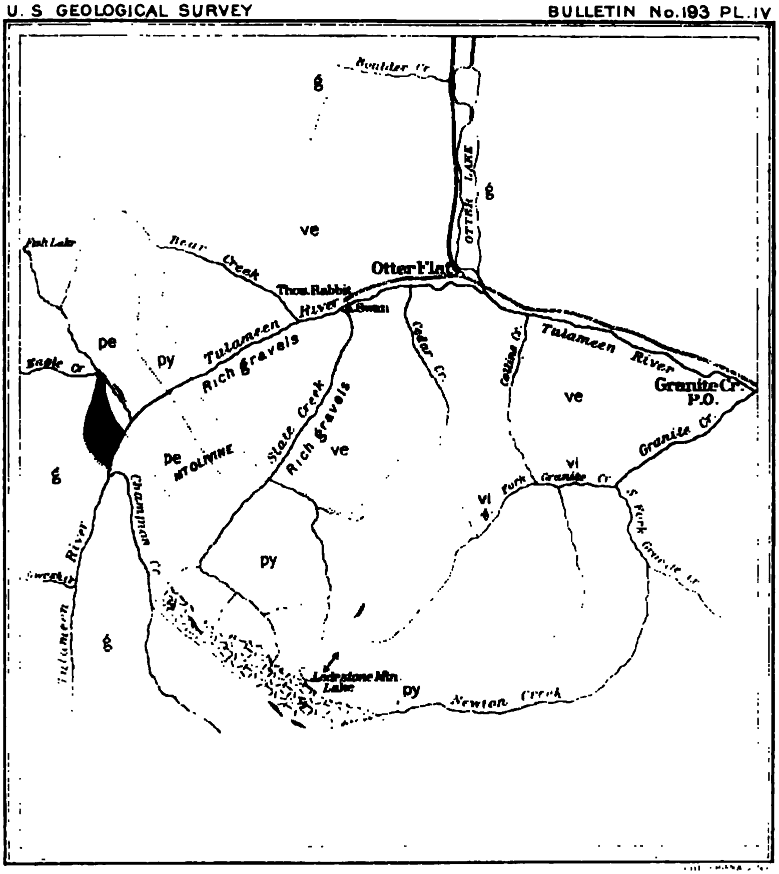
Merritt, W. H. Trans. Am. Inst. Min. Eng., Vol. XXIV., p. 755.

Penfield, S. L. Crystalline form of sperrylite: Am. Jour. Sci., 1889, p. 71.

Walker, T. L. Notes on sperrylite: Am. Jour. Sci., Feb., 1896, p. 110.

Wells, H. L. Sperrylite, a new mineral: Am. Jour. Sci., Jan., 1889, p. 67.

[b] Investigation of magnetic iron ores from eastern Ontario, by F. J. Pope: Trans. Am. Inst. Min. Eng., Vol. XXIX, p. 402.



GEOLOGICAL MAP OF THE TULAMEEN PLATINUM REGION, BRITISH COLUMBIA

BY

J. F. KEMP

Scale

miles

LEGEND

Volcanics

vl Later Miocene Rhyolite and Basalt

Green schist

pe Peridotite

ve Earlier Miocene

■ Quartzites and schists

py Pyroxenite Syenite

Dikes Rhyolite and diabas

Boundaries approximately accurate

Glacial striae

g Granite

until fifteen or sixteen years later was it saved. The accompanying map, Pl. IV, will serve to give the reader the geographical location of the district, and the later geological description will make clear the relations of the platinum.[a] In 1885 gold was observed in the gravels of Granite Creek, a tributary of the Tulameen, some 12 miles above its junction with the Similkameen.

Prospectors rushed into the district and washed the gravels not only of this creek but of the old bars on the Tulameen which had received attention as early as 1862. For several years the activity was considerable, and as much as $383,000 worth of gold is accredited to Granite Creek from 1885 to 1888. It had been recognized in 1862 that the gravels of the Tulameen yielded pay as far as Eagle Creek, which enters the Tulameen from the north, about 12 miles above Granite Creek, and during the later gold washing the richest platinum ground was found to begin at Eagle Creek and to extend downstream. Platinum also bore a high proportion to gold in Slate Creek, a tributary which enters the Tulameen from the south, about 8 miles above Granite Creek. The platinum in instances attained a ratio of 1:3 as compared with the gold. From these upper waters of the Tulameen, beginning at Eagle Creek and passing downstream, the relative amount of platinum gradually decreases, and while it is found in Granite Creek and in all the other placers of the drainage system of the Tulameen and Similkameen rivers, it nevertheless decreases in amount with the distance from Eagle Creek and the headwaters of the Slate. Printed descriptions of the geology of this district are few. Dr. George M. Dawson visited it in 1887, and as a result of his trip gave some valuable notes upon the mineral resources as well as the local geology in the report of the Canadian Geological Survey for 1887–88, Part R. Much light is also cast upon the local geology by the very valuable work of Dr. George M. Dawson upon the Kamloops map sheet, which lies about 50 miles to the north.[b] Some further notes upon the resources of the district will be found in a recent paper by W. J. Waterman.[c] A scale map with an outline geological section is given. During the summer of 1900 the writer spent nearly three months in the district investigating the geology of platinum along the Tulameen, and through the courtesy of the S. S. White Dental Manufacturing Company is permitted to contribute the following results:

As regards platinum, the area of chief interest is in the valley of Slate Creek and along the Tulameen River, below Eagle Creek. As will be seen by the accompanying map, which is roughly accurate for this region, a great dike of peridotite crosses the Tulameen at its junction with Eagle Creek, and extends in a general direction a little west of north as a huge mountain ridge. It runs to the south, reaching into the headwaters of Slate Creek, and constituting the highest summit of this divide. For convenience of reference the writer has called this summit Mount Olivine. Although the exposures are nearly all concealed by heavy sands and gravels in the upper waters of Slate Creek, the peridotite does not seem to extend farther in this direction, but it is cut off by a rock called pyroxenite on the map (Pl. IV). It is a curious fact that the pyroxenite also borders the peridotite on the east and likewise on the west, south of the Tulameen. To the southeast, however, the pyroxenite shades into syenitic varieties, which contain very considerable proportions of unstriated feldspar. Just above Eagle Creek, and on the northwest bank of the Tulameen, a small area of schists and quartzites more or less penetrated by dikes of porphyries is met. The relations of these rocks are obscure. Still farther to the west the whole country for a long distance consists of granite, and the granite has been again observed at the headwaters of Boulder Creek on the north. It presumably swings around from Fish Lake to Boulder Creek, and constitutes the intervening country at the headwaters of Bear Creek. The same granite appears along both shores of Otter Lake, and is therefore a very important member of the local geology on the northern and western side of the Tulameen. The pyroxenite is succeeded on the east by enormous masses of volcanic rocks of a general andesitic character, which appear to be the same as Dawson's Earlier Miocene volcanics, as described in the report on the Kamloops sheet. These volcanics are the most extensive formation in this central area, and they serve to conceal the older rocks. They have been somewhat compressed and sheared, and have evidently passed through fairly severe metamorphism. In the upper waters of the north fork of Granite Creek basalts and what appeared to be rhyolite were observed, which lack this metamorphism and which seem to correspond to Dawson's Later Miocene volcanics. At some point on the headwaters of Cedar Creek coals have recently been located, which are probably of Miocene age, corresponding to the Tranquille beds of Dawson. They have, however, been so altered as to possess coking properties. The writer observed Miocene float to the south of this region, but did not visit the coal exposures. On the southwestern border of the pyroxenite, at the headwaters of Slate Creek, a belt of green schists appears, which extends for several miles along the headwaters of Champion Creek. The actual contact of the pyroxenite and the schist is visible in the mountain region just to the west of the source of Slate Creek, but the two are so mashed together that it was impossible to determine which is the older. No contact metamorphism could be observed in the schist, and the writer

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[a] Reference to the early discoveries on the Similkameen will be found in the reports of the Canadian Geological Survey, 1862, p. 127; 1877–78, pp. 63B and 156B.

[b] Report on the geology of the Kamloops map sheet, by George M. Dawson: Geol. Survey of Canada, Vol. VII, Part B. The present writer is much indebted to the late Dr. Dawson for personal advice.

[c] Economic geology in the Similkameen district, by W. J. Waterman: British Columbia Mining Record, Vancouver, November, 1900. p. 411. A few notes at an earlier date are given by J. T Donald in *Engineering and Mining* Journal, March 19, 1892, p. 327.

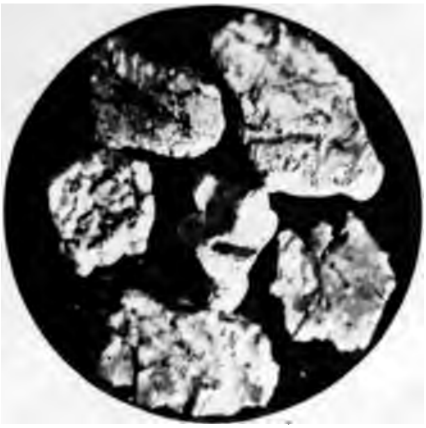
PLATE V.

PLATE V.

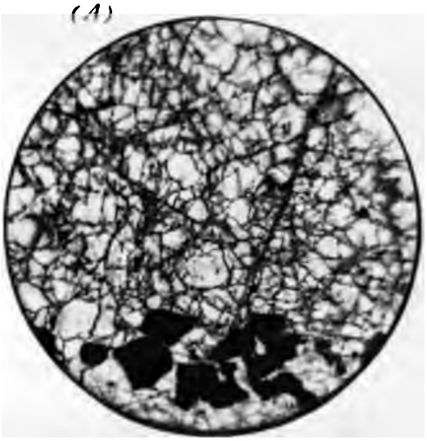
(*A*) Iridosmine, Slatousk, Urals. × 35 diam.

(*B*) Peridotite containing olivine and chromite, Tulameen River, British Columbia. × 70 diam.

(*C*) Serpentinized peridotite, Tulameen River. × 70 diam.



(A)



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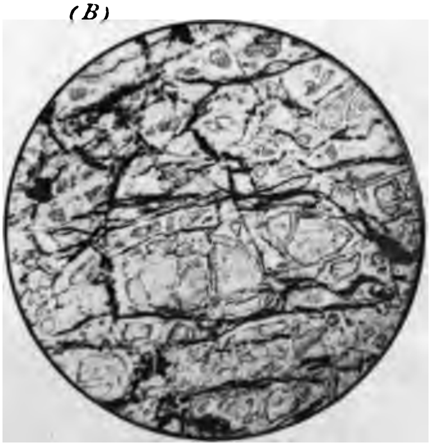

(C)

was unable to decide whether it is later or earlier than the pyroxenite. Several dikes of later eruptive rocks have penetrated all these older forms, and, as they show but slight traces of metamorphism, they are probably later than the Earlier Miocene volcanics. They are chiefly rhyolites or quartz-porphyries, but to the northeast of Lodestone Mountain and near the old Brigade trail a large dike of diabase was observed. This whole region has been extensively glaciated. Striæ were noted in two cases, one of which was along the Tulameen just above Eagle Creek, where the direction of the valley is somewhat east of north. The striations follow the trend of the valley and may have been influenced by it. A number of others were observed upon the summit of Lodestone Mountain, where the topography must have had less influence. They were closely parallel, however, to the previous ones.

An extensive and complex series of terraces may be also observed along the streams, and it is evident that the region has undergone a number of elevations and depressions in Pleistocene time. Along the Tulameen there is an almost continuous bench, of which now only stumps remain, and at Granite Creek post-office a number can be recognized up to 200 or 300 feet above the river. Opposite the mouth of Slate Creek a bench, which is washed in the hydraulic works of Alexander Swan, reaches an altitude by aneroid above the Tulameen of 330 feet. It causes Slate Creek to turn to the west and to enter the Tulameen in a direction against the current of the latter. The terrace evidently buries an old outlet of Slate Creek, which has been partially exposed by the hydraulic operations. A similar high bench of gravels has turned Champion Creek westward. It is possible that the presence of ice in the valley of the Tulameen is responsible for the deposition of these bars. Similar phenomena are not found on the north side. It may be added that the valley of the Tulameen and its branch creeks is a very narrow and steep one, and the topography gives every evidence of recent development. In its general character this entire country, as has been well set forth by Dr. George M. Dawson, is a plateau which has been deeply dissected by the present streams. The drainage has not been so long in operation as to smooth off the divides. The banks are yet so steep as to make zigzag trails a necessity.

The rocks which are of chief interest in connection with the platinum are the peridotite, the pyroxenite, and the granite. All petrographic details will be particularly limited to these.

MINERALOGY OF THE NUGGETS.

A careful search through large quantities of Tulameen platinum has revealed a considerable number of nuggets which contain chromite. A few have particles of olivine still adhering to them, and before the examination in the field was taken up it was expected the olivine rocks would be found in the region, although in Dr. Daws reconnaissance none were found, and the statement was made in his report that apparently none existed. It may be added that since the writer's return a nugget has likewise been discovered with adhering pyroxene, as has been stated on page 26. This association, as well as that with chromite and with olivine, is illustrated on Pl. III. When, however, the country was carefully observed along the upper waters of Slate Creek it was at once discovered that the great dike of peridotite, with its flanking pyroxenite, was present.

Peridotite.—The peridotite is an extremely interesting rock. It is of the variety dunite, and contains, so far as the writer's observations have gone, no other minerals than olivine and chromite. Some secondary serpentine and some amianthus can be found, and occasionally a little pyrite; but in its fresh condition the rock appears to be practically pure olivine, with occasionally a little chromite. Pl. V, *A* and *B*, will serve to illustrate it, and the following analysis, made in the laboratory of the United States Geological Survey by W. F. Hillebrand, indicates its composition:

Analysis of peridotite (variety dunite) from Eagle Creek, British Columbia.

SiO_2	38.40	H_2O+110°	4.11
Al_2O_3	.29	CO_2	1.10
Fe_2O_3	3.42	P_2O_5	Tr.
FeO	6.69	S	.06
MgO	45.23	Cr_2O_3	.07
CaO	.35	NiO	.10
Na_2O, K_2O	.08	MnO	.24
H_2O-110°	.24	Total	100.38

If we neglect the Al_2O_3, Na_2O, K_2O, H_2O-110°, S, Cr_2O_3, NiO, and MnO, and assume that the 4.11 H_2O is in serpentine, this analysis yields the following percentages of minerals:

Magnetite	4.90
Serpentine	31.49
Olivine	61.22
Calcite	0.63
Magnesite	1.58
Total	99.82

This result is undoubtedly very close to the truth.

The mass of the peridotite is occasionally traversed by veins of fibrous serpentine or amianthus, which appear to have been produced from the peridotite itself along lines of minor dislocation. The fibers of the serpentine run perpendicularly to the walls, as is the common case in such bodies of rock, and through the mass of the fibers grains of chromite are at times distributed in recognizable lines. These veins of serpentine become rusty on exposure and yield a bright red or brown decomposition product, which at once attracts the eye of a trav-

PLATE VI.

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PLATE VII.

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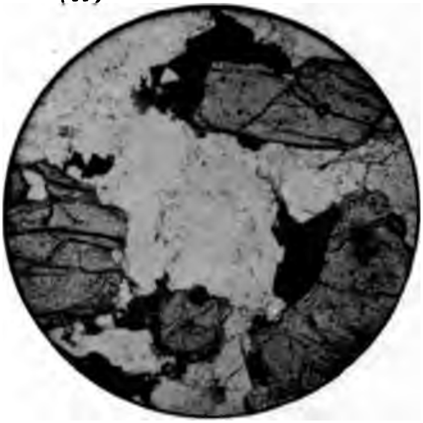
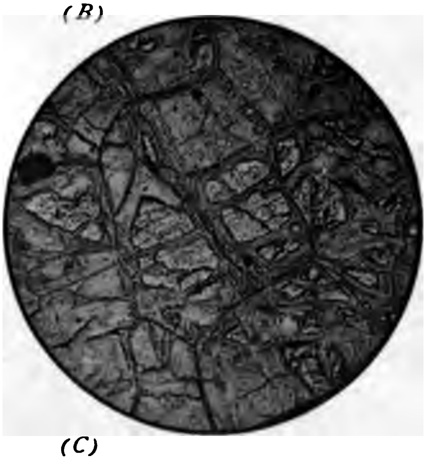
(A)



(B)



(C)

eler or prospector. Occasionally the peridotite becomes a dense black serpentine, especially in the vicinity of the dislocations. Shining specks of chromite appear through the dark-green mass. Every endeavor was made by the writer to discover in the midst of the peridotite a mass of chromite of large extent, but except for bunches the size of the fist or at times still larger, and for certain minor streaks and veinlets, the search was unsuccessful. Great masses of the rock appeared with no chromite at all except in microscopic form.

Pyroxenite; augite-syenite.—The pyroxenite is a black, rather coarsely crystalline rock, which, in typical cases when examined with the microscope and as shown in Pl. VI, *A*, contains practically nothing else than common green augite. It has sometimes been subject to geological deformation, and has then developed secondary hornblende, and in a few cases a little original brown hornblende has been observed. Magnetite is not infrequent, and at Lodestone Mountain it becomes a prominent feature in the rock. It occurs, however, richly distributed through the pyroxenite and not in large, pure segregations. In the upper waters of Slate Creek and in the headwaters of the North Fork of Granite Creek and of Newton Creek much feldspar enters the pyroxenite, changing it to an augite-syenite (Pl. VI, *B*). When examined microscopically all the samples of this rock which were obtained indicated unstriated feldspar, and therefore orthoclase, as the prevailing component. This was a matter of surprise, because in the field it was thought that the rock would certainly prove to be a gabbro or a diorite. On the contrary, it is a very basic syenite, and it therefore furnishes some interesting parallels with the rocks in the platinum region of the Urals. The discovery of pyroxene upon one of the platinum nuggets, and, so far as known, the entire absence of pyroxene in the peridotite, as well as the absence of olivine in the pyroxenite, make it probable that the platinum has been derived from both of these rocks. The pyroxenite is clearly a later rock than the peridotite, because on Mount Olivine (which name, as earlier stated, has been given to the high peak where the peridotite reaches its maximum elevation just south of the mouth of Eagle Creek) tongues and dikes of pyroxenite were found penetrating the peridotite, and on the slope of Mount Olivine toward the Tulameen dikes of pyroxenite in peridotite can likewise be observed. It is possible that the syenite is a separate intrusion from the pyroxenite, but no evidence of this was met, and it seemed more probable, from such relations as could be discovered, that they shade into each other.

MOTHER ROCK OF THE PLATINUM.

In the endeavor to trace the platinum back to its original location in the mother rocks, it was evident after a brief survey of the ground that to be of economic importance it must occur in some special form of the peridotite or pyroxenite. Mountainous masses of these rocks could not, in the nature of the case, be systematically sampled and assayed. The abundance of chromite in the nuggets would lead one to search first of all for masses of chromite, and secondly one would wish to test every other peculiar type of rock. These latter were practically the veins of serpentine and the dikes of pyroxenite in the peridotite. Incidentally, too, a number of assays were made of the typical country rocks, of the basic dikes, such as diabase, and of the varieties rich in magnetite from Lodestone Mountain. As has been already stated, no deposits of chromite of large size could be found. Assays of the serpentine veins have yielded in a number of cases platinum in amounts varying from a trace to nearly 2 ounces to the ton, but more extended sampling did not indicate a sufficiently even distribution of the platinum to justify exploitation. Assays of the older pyroxenite from lines of dislocation and from Lodestone Mountain, where the contained magnetite is abundant, failed to give other than very small traces or nothing whatever. A most careful search was made over the talus slopes and the exposed ledges in the endeavor to discover platinum in place, and hundreds of hand specimens in which chromite was especially abundant have been examined with the lens. In no case could a nugget be found. But it is fair to state that, when in small bits, chromite yields a shining fracture that is very difficult to distinguish from platinum itself, and while the writer was in no case able to assure himself, even by microscopic examination, that platinum was present, it is possible that very small scales of it were overlooked. Masses of rock rich in chromite were cobbed in several cases and were crushed and panned, but even in the concentrates it was not certain that platinum was present. Assays, however, did indicate it./ The conclusion is therefore inevitable that the platinum, as a rule, is in excessively fine scales and that the large nuggets are rare. It requires the concentration, in the processes of weathering, of an enormous mass of rock in order to yield the gravels. The drainage system in British Columbia is comparatively young, and no such amount of rock has been exposed to concentration as has been the case in the old and long eroded region of the Urals. Probably from this cause the amount of the gravels as well as of/the available platinum is less in British Columbia than in Russia/

Rumors are current along the Tulameen that platinum had been discovered in former years near the mouth of Siwash Creek, which enters the Tulameen about 3 miles above Eagle Creek. Accordingly, a trip was made to this locality with a view of testing the report. The trail crosses Siwash Creek half a mile or more above its junction with the Tulameen and at an elevation of 200 or 300 feet above the latter. Below the ford Siwash Creek flows in a deep and narrow gorge, with numerous cascades, all due to the sheeting of the granite. In several places not far below the trail lines of dislocation are evident. One crosses the Siwash at right angles to its line of flow and has changed the granite to a more or less decomposed mass over a width of 15 to 20 feet. The granite is stained green by chlorite. Assays of this material indicated a trace of platinum. At the first high cascade, a short distance below, the creek flows in a gutter caused by a belt of schistose rock, the schistosity appearing to be the result of excessive shearing in the granite. Samples of this material yielded good qualitative tests for platinum, although not enough to weigh. The identification of platinum in a rock of this character is extremely interesting, because it is a highly acidic eruptive and in strong contrast with the olivine and pyroxene rocks with which platinum is especially identified. The granite at Siwash Creek consists of quartz, orthoclase, plagioclase, biotite, and a little epidote. It is a typical granite, and except for the manifest effects of crushing does not deserve detailed description. Whether the platinum has been introduced in solution along lines of dislocation or whether it was an original mineral in the igneous rock can not be stated. No assays have been made of the unaltered material, and, so far as is known to the writer, its presence is limited to the lines of dislocation. The granite along Siwash Creek is also penetrated by a number of narrow dikes of diabase, but so far as known these are barren of platinum.

The following table gives the results of about 35 assays. Where trace is given it means a coloration test.

Tabulation of assays of platinum-bearing rocks from the Tulameen district, British Columbia.

Kind of rock.	Ounces per ton.	Remarks.
Banded zone of fibrous serpentine in peridotite.	.25	Rusty; poor in chromite.
Do	Tr.	0.2 per cent chromite, by panning.
Do	None.	0.5 per cent chromite, by panning.
Do	.25	
Do	None.	
Do	None.	
Do	None.	
Do	None.	
Do	.125	Some gold—not all platinum.
Chromite or rock rich in chromite	.5	Selected chromite.
Do	None.	Rock rich in chromite.
Do	None.	Do.
Do	None.	Do.
Do		8 per cent chromite on panning.
Do	Faint tr.	Peridotite, 4.5 per cent chromite.
Olivine-diabase	None.	Typical olivine-diabase.
Do	None.	Bowlder.
Pyroxenite dike	.25	In peridotite.
Do	.125	Pyroxenite rich in magnetite, dike in peridotite.
Pyritous talcose rock	Faint tr.	Pyritous streak in peridotite next a quartz-porphyry dike.
Crushed pyroxenite	Faint tr.	Serpentinized pyroxenite along a line of displacement.

Tabulation of assays of platinum-bearing rocks from the Tulameen district, British Columbia—Continued.

Kind of rock.	Ounces per ton.	Remarks.
Peridotite	Faint tr.	Fresh peridotite.
Serpentinized peridotite	Faint tr.	
Do	Faint tr.	
Serpentine	Faint tr.	
Dark serpentine	Faint tr.	
Fresh peridotite	Strong tr.	
Sheared pyroxenite	None.	
Do	None.	
Serpentinized peridotite	None.	From crushed zone.
Do	Faint tr.	11 per cent chromite.
Sheared granite	Faint tr.	Sample from 20 feet of face.
Altered granite	.125	Much chlorite.
Granite	Faint tr.	Next trap dike.
Schistose streak	.125	Probably a sheared granite.
Pyroxenite	Faint tr.	Dike in peridotite.
Old volcanics		Slight trace of iridio-platinum.
Do	None.	

The early placer washings and the two or three later hydraulic plants were all operated upon the gravels above the levels of the main creeks or in the shallow waters where bed rock was not deeply buried. Some later projected enterprises are based on dredging the Tulameen, but they have not yet assumed visible shape.

An analysis of the Tulameen platinum was made by Dr. G. Chr. Hoffmann, chemist of the Geological Survey of Canada.[a] The sample weighed originally 18.266 grams. Of this, 17.894 was platinum and the rest rock matter—magnetite, a little pyrite, and a few flakes of gold. Sp. gr. of platinum, 16.686. The platinum was separated into a magnetic part, 37.88 per cent, and a nonmagnetic part, 62.12 per cent. These were analyzed separately, and then the total analysis was computed, as follows:

Analysis of platinum from the Tulameen River, British Columbia.

	Magnetic.	Nonmagnetic.	Total.
Pt	78.43	68.19	72.07
Pd	0.09	0.26	0.19
Rh	1.70	3.10	2.57
Ir	1.04	1.21	1.14
Cu	3.89	3.09	3.39
Fe	9.78	7.87	8.59
Iridosmine	3.77	14.62	10.51
Embedded chromite	1.27	1.95	1.69
	99.97	100.29	100.15

Nonmagnetic, sp. gr. 17.017; magnetic, sp. gr. 16.095.

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[a] *Report of* the Survey, Vol. II, 1886, Part T. Trans. Roy. Soc. Canada, Vol. V, 1887, p. 17.

In each case some of the grains contained chromite. It is evident that iridosmine is relatively high in the nonmagnetic portion and that iron is the same in the magnetic portion. Dr. Hoffmann has announced the occurrence of platinum in the black sand of Rock Creek, a tributary of the Kettle River, Osoyoos division, Yale district.[a] Platinum has also been met in small quantities at Lilooet and elsewhere in the drainage of the Fraser River.

ALBERTA.

Dr. Hoffmann has detected platinum in sands from near Edmonton, on the North Saskatchewan River.[b]

NORTHWEST TERRITORY.

Platinum has been reported in the black sands which have been obtained from the Yukon off the mouth of the Teslin and the Lewes rivers. The amounts are stated to be considerable. Forty cubic feet of sand are said to have yielded 12 pounds of concentrates, which contained platinum at the rate of 96 ounces to the ton. This means about two-fifths of an ounce to a yard of gravel.[c]

UNITED STATES.

ARIZONA.

Specimens of a shaly rock have been sent to the East from some locality near Williams, Arizona, which have yielded assays for platinum. The clays in Cataract Canyon, a branch of the Grand Canyon, are also said to contain platinum.

CALIFORNIA AND OREGON.

As soon as the gold washings were developed in California, in 1849, scientific interest was attracted to the small accessory minerals which occurred with the colors. The presence of platiniridium was early announced by R. M. Patterson, of the Philadelphia mint,[d] and subsequently platinum itself was discovered in a great many places. The most productive deposits are in Trinity County, along the Trinity River, 3 to 4 miles below Junction City, but the annual product amounts to only a few ounces. Platinum and iridosmine have also been found in the beach gravels at Port Orford, which is in Oregon, some distance north of the California line. Some interest has been felt in saving these minerals, but they are excessively fine and the quantity not great. They occur along the coast at other localities near this int. Further details will be found in the subsequent citations. The atinum resources of California have been very carefully investigated D. T. Day, who has published a paper[a] summarizing and tabulating e results of many tests. Dr. Day's results are herewith quoted in ll.

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[a] Report Geol. Survey Canada, Vol. VI, Part R, p. 9.

[b] Idem, Vol. V, Part R. p65

[c] U. S. Consular Reports, Vol. LIX, 1899, p. 567. The Teslin River is here called the Hootalinqua. The Mineral Industry, Vol. VII, p. 569.

[d] The earliest announcement of platinum from California known to the writer is by R. M. Patterson, Ueber die Beschaffenheit und das Vorkommen des Goldes, Platins, und der Diamanten in den Vereinigten Staaten: Zeitschr. Deutsch. geol. gesell., Berlin, Vol. II, 1850, p. 61. The paper is a translation of a portion of a letter which was addressed to the American Secretary of State by Mr. Patterson, of the Philadelphia mint.

As early as 1852 Prof. W. P. Blake[b] called attention to the existence of platinum Port Orford, on the Oregon coast, and noted that the platinum equaled from 10 30 per cent of the gold. This article seems to be the original source of the statement that the proportion of platinum to gold increases northward. B. Silliman,[c] his mineralogic notes on California, etc., extended our knowledge to the occurnce of platinum in the older deep placers, worked by the hydraulic process in tte County. He also notes the occurrence of iridosmine with the platinum. eanwhile T. Sterry Hunt had found platinum and iridosmine on the Rivière du up, Quebec, Canada, in 1851.

The various notes concerning the finding of platinum on the Pacific coast have en well summarized in the publications of the California State mineralogist, and ow that platinum has been found at many places on the Pacific beach from as r south as San Bernardino County northward to the mouth of the Columbia. definite reports have been made of its occurrence farther north, on the Washgton beach, but its amount is certainly not great. The principal beaches where atinum has been reported, beginning at the south, are: Santa Barbara, Lompoc, e beaches of San Luis Obispo County, Santa Cruz, and occasionally between nta Cruz and the Golden Gate. In accordance with Blake's statement, the rich- beaches are farther north, in Humboldt and Del Norte counties. The beach mines of Gold Bluff, north of Arcata, Big Lagoon, Stone Lagoon, Little River, Crescent City, California, and Gold Beach and Port Orford, in Coos County, Oregon, have all yielded platinum in commercially appreciable quantities. Still farther north platinum is found at Yaquina Beach, Oregon, but the sands there are poor. Port Orford has proved, perhaps, the richest beach.

Sharpless and Winchell have made an unusually careful examination of the sands at Bandon, on the Oregon beach. They almost invariably found platinum, but the proportion was not so encouraging as less careful workers had estimated. All this beach platinum is discouragingly fine and difficult to save.

Most of the platinum product has come from inland diggings, where the grains are comparatively coarse. It has become well known in the placers of the American River, and in Plumas, Shasta, Trinity, and Siskiyou counties, California. The Bee Gum district in Shasta County, the Hay Fork district in Trinity County, and the deposits along the Trinity from Chapman's mine, south of Junction City, northward to beyond North Fork, are most promising.

Conditions of occurrence.—Though platinum metals are so frequently found in many of the gold placers of the region including Trinity, Shasta, and Siskiyou counties, their occurrence in this region is by no means universal. There seems, for example, to be no platinum in the Weaverville placers on the Trinity. The platinum-bearing placers confirm the accepted idea that the platinum originates in the serpentine rock in which this region abounds; for the platinum-bearing gravels are sure to be closely associated with some prominent serpentine ridge. Nevertheless, no platinum has yet been found in place within the area named.

A hurried trip through this region enabled the writer to learn, by the analytical aid of Dr. Waldron Shapleigh, that in the Bee Gum district of Shasta County, at

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[a] Trans. Am. Inst. Min. Eng., February, 1900, Vol. XXX. p. 702.

[b] Am. Jour. Sci., 2d series, Vol. XVIII, p. 156, and Vol. XXII, p. 8.

[c] Am. Jour. Sci., 3d series, Vol. VI, p. 132.

Hay Fork, and at Chapman's mine, on the Trinity, osmiridium makes up perhaps the greater part of the mixture of platinum metals. At Chapman's mine Colonel Barrows obtained 30 ounces of small nuggets averaging one-third inch in diameter, apparently altogether too hard for platinum, and yet considerably coarser than is usual for osmiridium, which has the habit of occurring in very small scales. Dr. Shapleigh has shown that these nuggets yield a small amount of platinum on treatment with aqua regia, and then fall apart into the ordinary scales of osmiridium. He has found, also, that the Pacific beach platinum often contains more than 90 per cent of osmiridium. This explains the fact that little effort has been made to mine the platinum, for until recently the osmiridium has had practically no value.

At the time of my visit platinum was noticed also in the placers near Grants Pass, Oregon, and by examining numerous samples of black sands traces of platinum were found in the Snake River from Bakersville to Lewiston, and in a sand reported to come from Miles City, Montana.[a]

In examining the well-known platinum localities on Granite Creek, near its junction with Tulameen Fork, in British Columbia, it was estimated that the placers contained about one-fifth as much platinum as gold. I could get no test for osmium, but Dr. Hoffmann, of the Canadian geological survey, has found samples of platinum yielding as high as 25 per cent, and on the average about 10 per cent, of osmiridium.

In further search for the platinum metals, the writer collected heavy sands from placer mines in California, Oregon, Washington, Idaho, Montana, and Alaska. These samples averaged 4 pounds in weight. The sand was first separated by ordinary assay sieves into about nine sizes: Coarser than 20-mesh; through 20, 40, 60, 80, 100, 120, 160, and then 200 mesh. Each size was then in good condition for easy separation of the highly magnetic portion by a rude form of separator. By limiting the magnetic separation to the highly magnetic particles, very little gold or platinum was removed with the magnetic portions, as the panning of these portions proved.

By panning each size and then counting (or weighing, where the amount was considerable) the flakes of gold and platinum a fair idea of the proportion of platinum to gold could be gained. As the sieving was carried to such uniform sizes, it was possible, by counting weighed amounts, to estimate the unit weights of flakes of the different sizes, and thus to approximate, roughly, the total weight of gold and platinum obtained:

The results are shown in Table I.

In addition to the sands mentioned above, about 25 ounces of Klondike gold dust was examined, and only a grain or two, probably of platinum, was found.

A number of concentrates collected by Mr. A. H. Brooks, of the United States Geological Survey, from the Tanana River district, in Alaska, and also the beach sands brought from Cape Nome by Mr. Brooks and Mr. Schrader, showed no platinum.

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[a] Dr. F. W. Traphagen confirms this find of platinum at Miles City, Montana. The concentrated sand examined by him contained 10 per cent of platinum.

TABLE I.—*Pan tests of platinum-bearing gold sands.*

Post-office and State.	Weight of sample, in ounces.	Value of platinum metals per ton.	Percentage of platinum to gold.
CALIFORNIA.			
Crescent City, Del Norte County	80	$0.04	17
Smith River, Del Norte County	23	0.54	6.8
Crescent City, Del Norte County (South Fork Smith River)	62	681.31	2.230
Trinity Center, Trinity County	35	0.28	79
Burnt Ranch, Trinity County	45	13.09	104
Weaverville, Trinity County	20	0	0
Big Bar, Trinity County	40	3.75	11
Junction City, Trinity County	49	1934.18	----------
Hawkins Bar, Trinity County	63	4.05	34
Randsburg, Kern County	50	0	0
Wilson Creek, Humboldt County	45	0.02	8
Big Lagoon, Humboldt County	60	0	0
China Flat, Humboldt County	25	177.08	138
Orleans, Humboldt County	36½	6.87	50
Hamburg, Siskiyou County	20	0	0
Do	55	.86	280
Sawyers Bar, Siskiyou County	79	2.39	31
Oak Bar, Siskiyou County	123	0.54	12
Fort Jones, Siskiyou County	51	0.07	.1
Sawyers Bar, Siskiyou County	45	0.07	3
Klamath River, Siskiyou County	63	2.40	51
Rock Ranch, Siskiyou County	29	0.51	26
Callahan, Siskiyou County	58	7.02	134
Hornbrook, Siskiyou County	19	0.18	06
Callahan, Siskiyou County	25	0	0
Scott River, Siskiyou County	9	1.83	.6
Happy Camp, Siskiyou County	48	50.97	148
Cecilville, Siskiyou County	20	2.01	14
Do	14½	0.15	8
Walker, Siskiyou County	37	0	0
Shasta River, Siskiyou County	30	0	0
Klamath River, Siskiyou County	30	0	0
Gottville, Siskiyou County	20	0	0
Camptonville, Yuba County	37	.32	4
Do	50	0	0
Quincy, Plumas County	40	0	0
Laporte, Plumas County	50	0	0
Butte Valley, Plumas County	35	0	0
Do	30	0	0
Slate Creek, Sierra County	40	0	0
Gibsonville, Sierra County	50	0	0
Do	20	0	0
Chico, Butte County	40	5.46	8.4
Magalia, Butte County	60	0.30	1.2
Inskip, Butte County	20	0	0
Brownsville, Butte County	30	0	0
Michigan Bluff, Placer County	56	.34	1
Do	59	0.19	.1
Grizzly Flats, Eldorado County	40	0	0
Smith Flat, Eldorado County	40	0	0
Railroad Flat, Calaveras County	50	0	0

TABLE I.—*Pan tests of platinum-bearing gold sands*—Continued.

Post-office and State.	Weight of sample, in ounces.	Value of platinum metals per ton.	Percentage of platinum to gold.
CALIFORNIA—continued.			
Mokelumne Hill, Calaveras County	84	$0.02	.2
Genesee, Plumas County	63½	0.06	.008
OREGON.			
Denmark, Curry County	25	1.08	300
Denmark, Curry County:			
No. 1	49½	.06	20
No. 2	44½	0	0
No. 3	50½	.15	18
No. 4	48½	.24	10
No. 5	47½	.25	60
No. 6	45	.32	121
No. 7	50	0	20
No. 8	57½	.21	50
No. 9	53	.03	3.6
No. 10	50	0	0
No. 11	52	.01	12
2 miles north of Pistol River, on Oregon Beach	118	.06	8
2 miles south of Pistol River, on Oregon Beach	60	0	0
IDAHO.			
Rocky Bar, Elmore County	50	0	0
Princeton, Latah County	60	0	0
MONTANA.			
Forest, Missoula County	50	0	0
ALASKA.			
Sand from beach north of Lituya Bay	100	0	0

The total results above reported show that if all the sands examined were considered together, there would be about half as much of the platinum metals as of gold.

With regard to the percentage of platinum in the sands from various parts of the Pacific coast, Dr. Shapleigh has furnished the following table:

TABLE II.—*Percentage of platinum in sands from Pacific coast.*

Locality.	Metals.	Highest per cent.	Lowest per cent.
Bee Gum district, Shasta County, Cal.	Platinum	20	13.5
	The other platinum metals	84	79
Hay Fork district, Trinity County, Cal.	Platinum	73	30
	The other platinum metals	58	18
Trinity River district, California	Platinum	27	15
	The other platinum metals	80	72
Crescent City, Del Norte County, Cal.	Platinum	11	8
	The other platinum metals	83	46
Port Orford, Oreg.	Platinum	47	15
	The other platinum metals	83	23

The "other platinum metals" include iridium, osmium, ruthenium, rhodium, and palladium.

The platinum from California is characteristically low in iron and at times quite high in copper and iridium. It may also contain much iridosmine mechanically involved in the nuggets. In some of these respects it presents a contrast with the metal from Russia.

The following analyses have been collected from various sources:

Analyses of platinum from the Pacific Coast.

	1	2	3	4	5	6	7
Pt	85.50	79.85	76.50	63.30	....	57.45	57.75
Ir	1.05	4.20	.85	.70	53.50	.40	3.10
Rh	1	.65	1.95	1.80	2.60	.65	2.45
Pd	.60	.95	1.30	.10	....	.15	.25
Os	....	.05	1.25	....	43.40	....	.81
Ru	....	....	....	....	.50	....	....
Au	.80	.55	1.20	.30	....	.85	....
Fe	6.75	4.45	6.10	6.40	....	4.30	6.79
Cu	1.40	.75	1.25	4.25	....	2.15	.20
Iridosmine	1.10	4.95	7.55	22.55	....	37.30	27.65
Sand	2.95	2.60	1.50	....	....	3	....
Pb	....	....	.55?	....	....	....	....
Hg	....	....	....	.60	....	....	....
Total	101.15	100	100	100	100	100.25	99

NOTES TO TABLE.

Nos. 1, 2, 3, 5, and 6 are taken from the valuable paper by Deville and Debray in the Annales de Chimie et de Physique, Vol. LVI, 1859, pp. 449-481.

No. 4 is from Kromayer, Archiv Pharmacie, ii, Vol. CX, 14. Jahresberichte, 1862, p. 707.

No. 7 is by F. Weil, and was originally published in Armengand's Genie Industrielle, May, 1859, p. 262. See also Dingler's Polyt. Jahrbuch, Vol. CLIII, p. 41; Neues Jahrb., 1860, p. 354.

PAPERS REFERRING TO PLATINUM IN CALIFORNIA AND OREGON.

The following references to the occurrence of platinum in California will be found of interest:

CALIFORNIA, Annual Reports of the State Mineralogist, as follows: Vol. IV, 1884, pp. 309, 311 (on iridium, see p. 231); Vol. VIII, p. 217, for Humboldt County; p. 584, for Siskiyou County; Vol. IX, p. 717, for Trinity County; Vol. XII, p. 408, for Trinity County.

DAY, D. T., Notes on the occurrence of platinum in North America: Transactions American Institute Mining Engineers, Vol. XXX, p. 702, February, 1900.

GENTH, F. A., On a probably new element with iridosmine and platinum from California: Proceedings Academy Natural Sciences, Philadelphia, December, 1852, p. 209. American Journal of Science, March, 1853, p. 246. Dr. Genth does not mention the exact locality from which he obtained the sample. He notes the presence of sisserskite, $IrOs_4$, in six-sided scales, and some platin-iridium and native platinum. On analysis the platinum yielded Pt. and Pd. 90.24, Ir. and Rh. 2.42, Fe. 6.66, and sisserskite 0.68.

SILLIMAN, B., American Journal of Science, 3d series, Vol. VI, p. 132.

On platinum in Oregon the following will be of interest:

BLAKE, W. P., American Journal of Science, 2d series, Vol. XVIII, p. 156. Professor Blake states that in the placer gold of Port Orford, on Cape Blanco, *there is* as much as 10 to 30 per cent of platinum which in earlier years was *discarded.*

COLORADO.

A number of reports have been current of discoveries of platinum in Colorado, and the writer has seen several samples and the results of assays, but in no case were exact localities recorded. One sample resembles a black hornfels and probably came from a contact zone of eruptives on shale or slate. It was permeated by films of pyrrhotite. It resembled closely a similar rock which was said to have come from the Lake Superior region and which was circulated among geologists and consumers of platinum ten to fifteen years ago.[a]

GEORGIA.

Platinum has been reported from Lumpkin County, Ga., but the writer has been unable to obtain details of its geological relations.[b]

IDAHO.

Platinum has been discovered in the gold-bearing sands of the Snake River from Bakersville to Lewiston, along the western border of the State.[c]

MONTANA.

Platinum has been reported from the vicinity of Miles City.[d]

NEW YORK.

A remarkable nugget of platinum was found about 1880 in the glacial drift near Plattsburg, N. Y. In course of time it came into the possession of Prof. Peter Collier, who submitted it to a careful mineralogical and chemical examination. The nugget consisted of metallic platinum and chromite in the proportions of 46 per cent of the former and 54 per cent of the latter. It measured 4 by 3 by 2¼ cm. It weighed 104.4 grams. Its specific gravity was 10.446. The specific gravity of the separated platinum was 17.34. The nugget was slightly magnetic. After the chromite had been mechanically separated from this metallic portion, the latter was soluble all but 0.74 per cent. An analysis of the platinum yielded the following result:

Analysis of platinum from nugget found in glacial drift near Plattsburg, N. Y.

Pt	82.814
Ir	.627
Rh	.286
Pd	3.105
Fe	11.040
Cu	.397
Al_2O_3	1.953
CaO	.069
MgO	.030
Total	100.321

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[a] Compare note on the Rambler mine, Wyoming, p. 34.

[b] Charles Bullman, The Mineral Industry, Vol. I, p. 375.

[c] D. T. Day, Trans. Am. Inst. Min. Eng., Vol. XXX, p. 705, February, 1900.

[d] D. T. Day, idem, p. 705.

Some osmium was also present, but was not determined on account of the difficulty of the analysis. The gangue was mostly chromite and on analysis yielded the following:

Analysis of gangue of same platinum nugget.

Cr_2O_3	54.944
FeO	31.567
Al^2O_3	5.690
SiO^2	3.731
CaO	3.405
MgO	.941
Total	100.278

It is evident from these results that chromite is the chief component and it is possible that in it a little alumina may have replaced some of the chromic oxide. There remains uncombined, therefore, silica, lime, some alumina, and probably a little magnesia, although it is also possible that some, or even all, of the magnesia may have replaced a portion of the ferrous oxide of the chromite. Pyroxene would be the most natural mineral which would embrace the remaining uncombined elements.[a]

As this nugget was found in the glacial drift it has clearly been brought in from the north. The glacial striations near Plattsburg have been reported by H. P. Cushing to run from S. 15° E. to S. 15° W. and to be influenced by the local topography. Farther south the writer has noted them in the valley of the lake, as well as back in the mountains, to be S. 60° W. as a rule. A southwesterly movement of the ice sheet would have brought glacial material to Plattsburg from the great areas of serpentine which occur in Quebec north of Vermont and which are commercially productive of chromite. There seems little reason, therefore, to doubt that the nugget has been derived from this source, but as yet no platinum has been announced in the serpentine region.

NORTH CAROLINA.

In 1847 C. U. Shepard announced the discovery of platinum in a small sample of concentrates, which had been saved by Mr. T. J. Clingman, of Asheville, N. C., from gold washings in the northern part of Rutherford County. The platinum nugget weighed 2.541 grains, and had a specific gravity of 18. This, if authentic, was the earliest discovery of platinum in the United States, but the metal must be extremely rare in the region, because no further records of its occurrence in the metallic state have been made. North Carolina is rich in areas of serpentine and basic igneous rocks.[b] Prof. F. P.

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[a] A remarkable nugget of platinum, by Peter Collier: Am. Jour. Sci., 3d series, Vol. III, p. 123.

[b] Native platinum in North Carolina, by C. U. Shepard: Am. Jour. Sci., 2d series, Vol. IV, p. 280. See also Minerals and mineral localities of North Carolina, by F. A. Genth: Vol. II of *Geol. of N. C.*, p. 12. Two other localities are given, and palladium is also reported.

Venable, however, after a careful examination of the evidence has decided that the discovery was probably not authentic.[a]

After the discovery of sperrylite in the Sudbury region of Ontario, great interest was felt by all geologists in locating it in other places. In 1894 Mr. W. E. Hidden observed it in the pannings of gravels taken from the Ned Wilson branch, Coler Fork of Cowee Creek, Macon County, N. C. The quantity was small, and the announcement was not published until 1898, when more was found in connection with the mining of rhodolite, a variety of garnet of gem grade. Messrs. Hidden and Pratt subsequently traced the rhodolites to their parent rock, which proved to be a ledge on the top of Mason Mountain. The rock consists of rhodolite, biotite, and considerable iron sulphides. In pannings of some of the loose decomposition products taken from the surface of the ledge, crystals of sperrylite were discovered. This rare arsenide of platinum has therefore been found in place in North Carolina.[b]

PENNSYLVANIA.

In 1852 Dr. F. A. Genth detected platinum in a clay slate from Lancaster County, Pa. The slate contained chalcopyrite and galena, and when 300 grams were fused with oxide of lead and black flux they yielded a button which, on being cupelled, was found to contain from 0.0005 to 0.0014 per cent silver, gold, and platinum. Some iridium was likewise identified in a qualitative way. Ilmenite from the same general locality afforded tests for silver and platinum.[c]

Platinum has also been detected by assay in a black shale which occurs east of Boyertown and near the little village of Sassamansville. The locality is not far from the line between Montgomery and Berks counties. Although some tests afforded amounts sufficient to weigh, the distribution is too irregular and variable to warrant mining.[d] A vein from this vicinity containing quartz, pyrites, and oxidized lead minerals yielded one-half ounce per ton of platinum and either gold or palladium.

A pyritous dioritic gneiss from the Archean areas of Pennsylvania, locality not definitely known, has given assays from one-half ounce to over 2 ounces to the ton.

MEXICO.

Platinum has been reported from the Las Yedras mine, Sinaloa, but the writer has been unable to discover further particulars on record.[e] In a brief note on an interesting series of specimens from a quicksilver mine whose locality is not given, F. Sandberger has stated that with the ores he found some pseudomorphs of limonite after pyrites, which on assay yielded weighable amounts of platinum.[a]

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[a] Jour. Elisha Mitchell Sci. Soc., Vol. VIII, pt. 2, 1892. See also W. E. Hidden, Am. Jour. Sci., Vol. XXII, 1881, p. 25.

[b] Occurrence of sperrylite in North Carolina, by W. E. Hidden: Am. Jour. Sci., November, 1898, p. 381. See also same for April, 1898, p. 294, and for December, 1898, p. 467.

[c] F. A. Genth, Pharm. Centralblatt, 1852, p. 72.

[d] Information kindly furnished by A. W. Johnston.

[e] Charles Bullmann, The Mineral Industry, Vol. I, p. 375.

CENTRAL AMERICA.

HONDURAS.

Platinum has been reported from Choloteca and Gracias, but further particulars are not available.[b]

WEST INDIES.

SANTO DOMINGO.

Very early in the history of platinum, grains were brought from Santo Domingo, probably in connection with the endeavors of the French to acquire possession of the island. The grains were obtained from the gold washings of the Yaqui River (or, as it is also spelled in foreign articles, Jacky, or Jacki, or Iacki). The Yaqui rises in the central part of the Republic and flows northwest into the sea near the boundary with Haiti. The French chemist, Vauquelin, submitted some of the grains to chemical examination in 1810. He first dissolved off a ferruginous crust, which gave a yellow solution with hydrochloric acid. In this way 0.3 gram was lost in a total of 36.7. On solution in aqua regia a residue of 0.8 gram was obtained, consisting of little black needles, with some quartz and a black sand. The needles were considered iridium and the black grains chromite. Qualitative examination yielded tests for copper, iron, chromium, osmium, iridium, rhodium, and palladium. M. Vauquelin believed that titanium was also present, but he obtained no test for gold.[c]

SOUTH AMERICA.

BRAZIL.

Platinum was observed at a very early date in the gold washings of Brazil. In the valuable description of this great country by C. F. Hartt it is specifically recorded as being found in several places in the province of Minas Geraes. The localities are chiefly in the basin of the Rio das Velhas, in the southern central part of this State. The country rock is described by Hartt as a syenitic gneiss which is cut by quartz veins. In the Bõa Esperança veins platinum is said to be present, and at Gongo Seco, 20 miles east of Morro Velho, the gold is said to contain palladium. Hartt remarks in general that the gold of Brazil is always alloyed with silver and occasionally with platinum.

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[a] Neues Jahrbuch für Mineral., 1875, p. 625.

[b] Charles Bullmann, The Mineral Industry, Vol. I, p. 375.

[c] L. N. Vauquelin, Analyse du platine trouvé à Saint-Domingue: Annales du Museum d'Histoire Naturelle, Vol. XV, 1810, p. 317. Compare also Guyton de Morveau, Annales de Chemie, *Vol. LXXIII*, 1810, p. 334. A. Vogel, Platinerz von San Domingo: Jour. Chem. Soc. London, Vol. *XXVII, 1874, p. 196.*

It may likewise contain iron. Iridium and iridosmine occur in the gold washings of Minas. This reported occurrence of platinum in veins is an exceedingly interesting and important one, and corroborates in a general way the statements already made for several other places. Additional citations by Hartt are reproduced below, but the original sources have not been accessible to the writer. A peculiar variety of gold, known as "ouro preto," is obtained in this region. It was formerly collected in considerable quantity, but now only the poorest laborers pay attention to it. A sample obtained from O. A. Derby was analyzed in 1882 by W. H. Seamon, who gives the composition as follows:

Analysis of ouro preto from Brazil.

Gold	91.06
Palladium	8.21
Silver	Trace.
Iron	Trace.
Total	99.27

Specific gravity, 15.73.

The iron was regarded as a mechanical adherent. When calculated the formula is $PdAu_6$. Berzelius, in 1835, published a similar analysis from Porpez. This variety was called porpezite.

Analysis of porpezite from Brazil.

Gold	85.98
Palladium	9.85
Silver	4.17
Total	100.00

The geological relations of the peculiar gold-palladium alloy have been described by Johnson and Lampadius, as follows: The alloy occurs in beds of a rock, called by the natives zacotinga (or jacotinga), which is an aggregate of specular hematite, mica, quartz, and pyrolusite. This is the itabirite of the European writers. The rock is crushed and washed.[a]

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[a] Berzelius, Neues Jahrbuch für Mineral., 1835, p. 184. J. Cloud, Palladium in Brazilian gold: Poggendorf's Annalen, Vol. XXXVI, 1810, p. 310. C. F. Hartt, Geology and physical geography of Brazil, pp. 448, 542. Johnson and Lampadius, Journal für prakt. Chemie, Vol. X, 1837, p. 501. See, also, on the rock, Housser and Claraz, Zeit. Deutsch. geol. Gesell., Vol. XI, 1859, p. 448. Lampadius and Plattner, Ueber das gemeinschaftliche Vorkommen des Platinerzes und des gediegen Silbergoldes in einem Gangfossile aus Brazilien: Jour. technische Chemie, Vol. XVIII, 1833, p. 453. (Not accessible to J. F. K.) W. H. Seamon, Analysis of native palladium gold from Taguaril, near Subara, Minas Geraes, Brazil: Chemical News, Vol. XLVI, 1882, p. 216. Williamson, Geology of the Parahyba Gold Region: Trans. Geol. Soc. Manchester, England, Vol. VI, 1866, p. 113. W. H. Wollaston, On platina and native palladium from Brazil: Philos. Trans. Royal Soc. London, Vol. XCIX, 1809, p. 189.

The following authorities are likewise cited by Hartt: Burton, The Highlands of Brazil; Castelnau, Expedition dans l'Amérique de Sud; von Eschwege, Geognostisches Gemaelde von Brasilien. No mention of platinum could be found by the writer in v. Eschwege's Pluto Braziliensis.

FRENCH GUIANA.

An announcement was made to the French Academy, in 1861, by Damour, that a very curious nugget had reached him from Aïcoupaï, on Hamelin Creek, in the basin of Appronaguel. It weighed 0.85 gram. Its specific gravity was 13.65. It was malleable, silvery white, and less fusible than gold. On analysis it yielded:

Analysis of nugget from basin of Appronaguel.

Platinum	41.96
Gold	18.18
Silver	18.39
Copper	20.56
Total	99.09

It dissolved so easily in nitric acid that it was believed to be clearly a mechanical mixture, and not an alloy—that is, the copper and silver were easily removed, and a brown sponge of gold with white scales of platinum remained.[a]

COLOMBIA.

Platinum was first discovered in connection with gold washings in Colombia. The original sample was obtained at Cartagena and was brought to Europe in 1735. The sample was reputed to have been obtained in the river Pinto, a stream which the writer has been unable to locate on the modern maps. Colombia is now a producer of commercial platinum second in rank to the Urals. The deposits are all in the form of placers and are situated upon the western watershed, near the divide which separates the waters of the northerly flowing Atrato from those of the southerly flowing San Juan. The general district is called El Choco. It embraces two provinces—a northerly one, named Atrato, whose capital is Quibdó, and a southerly one, San Juan, whose capital is Novita. The greater part of the platinum is obtained in San Juan. It occurs with gold along the main stream and its tributaries from its junction with the Sipi to the headwaters. Charles Bullman states that below the Tamana the proportion is ten to one in favor of gold, while above it is two to one. The only outcropping rocks in the basin of the San Juan appear to be of very recent origin. They are described by Bullman as indurated clays and conglomerates, probably of Tertiary age. As Bullman was unable to discover evidences of marine life, he considers them to be fresh-water deposits. The sediments are at present much tilted, and are supposed to have been upheaved at the close of the Tertiary. There is evidence also of glacial action, according to Bullman, the ice having moved from northeast to southwest, and having transported bowlders, clay, sand, and the precious metals. These later deposits, in part at least of glacial origin, are locally called caliche. Bullman defines the word as follows: "By caliche is meant sand, pebbles, and bowlders bound or held together by clay, or it may be called a weathered, disintegrated, cement gravel." As shown in the accompanying section (fig. 3), the caliche rests upon clays and conglomerates. The present drainage has cut deeply into both the latter formations, and has concentrated in the river gravels the precious metals which were contained in the formations now constituting the banks. It is believed that the gold and platinum have come from the granitic, syenitic, and metamorphic rocks of the Andes. Mr. Bullman concludes that very little has been derived from fissure veins, although more or less quartz containing gold is obtained in the gravels.

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[a] Damour, Comptes rendus, Vol. LII, 1861, p. 688.

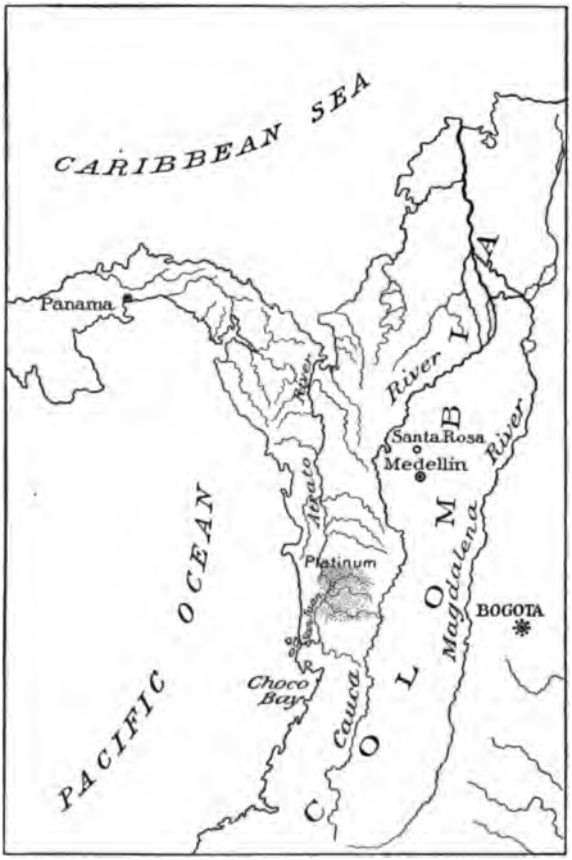

FIG. 2.—Sketch map of Colombia, showing the location of the platinum placers.

In mining, attention is paid both to the bars in the running streams and to the caliche. In working the former the miner builds up a little barricade of larger bowlders, in the lee of which the sands are dug up and washed in a batea. Women are more especially engaged in this work. The mining is carried on in a desultory manner, the natives working at low water and being content with such returns as supply the necessaries for their simple life in this region.

When sufficient water can be readily obtained it is used to sluice the caliche, which is broken down by bars, raked over somewhat with a crooked tool, and tumbled into the sluices. At periodic intervals the clean-up takes place. Some more ambitious attempts have been made to dredge the rivers, but without much success, the gravels being of low grade.

The nuggets of platinum occasionally carry chromite, but, although a considerable quantity has been examined by the writer, through the courtesy of Mr. A. W. Johnston, of the S. S. White Dental Manufacturing Company, other minerals aside from gold have not been observed. Other observers have recorded the characteristic presence of zircons. The nuggets occasionally reach rather large size. One in the museum of the geological department of Columbia University weighs 52.597 grams and has a specific gravity of 13.584. Assuming a specific gravity for platinum of 17.6 and for chromite of 4.5, this would imply 16.124 grams of chromite and 36.473 of platinum. It was obtained by Mr. Bullman. A still larger one is owned by Baker & Co., of Newark, N. J. Its weight is stated to be about 2 pounds.

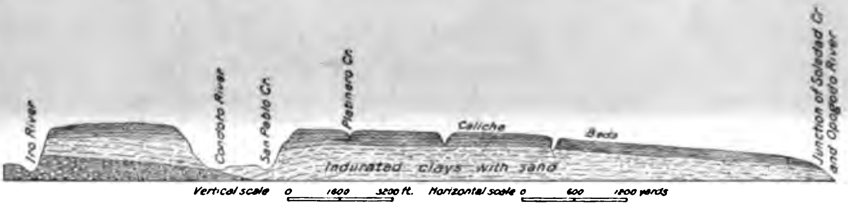
Iro River
Condoto River
San Pablo Cr.
Platinero Cr.
Caliche
Beds
Junction of Soledad Cr. and Opogodo River
Indurated clays with sand
Vertical scale 0 1600 3200 ft.
Horizontal scale 0 600 1200 yards

FIG. 3.—Geological cross section of the caliche beds from the Iro to the Opogodo. (After Charles Bullman.)

Gold has also been observed involved in the nuggets of platinum, and it seems at times to occur with the latter mineral in the mother rock. The platinum has not been definitely traced back from these washings to the mother rock, but some observations were made, as far back as 1826, by Boussingault, a French traveler, who communicated them to Humboldt, by whom they were laid before the French Academy. Humboldt presented them with an introduction of his own, which has given the impression that the observations were made in Brazil, and has occasioned the erroneous citations of platinum from the province of Antioquia, Brazil, which appear in Dana's Mineralogy and elsewhere. M. Boussingault's observations were made at Santa Rosa, province of Antioquia, Colombia, about 10 leagues northeast of Medellin. The locality is situated 2,775 meters above the sea. The country rock is described as a syenite or syenitic gneiss of the same general quality as that which prevails at Medellin, and it is cut by many veins of quartz. The surface is covered by alluvium, which has been concentrated by the streams. Together with the gold, occasional lumps of limonite are met and are saved by the gold washers. They are afterwards pounded up and panned down, because they contain considerable gold. Other lumps of limonite are gathered directly from the outcrops of the veins and appear to be portions of the gossan. In the pannings of one of these lumps derived from the outcrop of a vein, Boussingault obtained grains of platinum which were the same in appearance as those washed from the gravels of El Choco. While the specimen was not found absolutely in place, there seems reason to believe that Boussingault has correctly referred it to its original situation, and has therefore recorded a very important and interesting case of the occurrence of platinum with other metallic minerals in a vein whose filling was largely quartz. Boussingault states that the syenite, together with porphyritic greenstones, extends from Santa Rosa over into the Choco district.[a]

EUROPE.

AUSTRIA-HUNGARY.

A few scales of platinum have been discovered as a very rare mineral in the gold-bearing sands of Ollálipian, Siebenbürgen.[b]

FRANCE.

Scales of platinum in very small amounts have been discovered in one or two places in France in connection with gold. Thus at Morbihan, in Brittany, it is occasionally seen with gold in tin-bearing sands which occur along the coast. It is likewise known at Gard, in Cevennes.[c]

The announcement was made in 1833 that platinum had been detected in galena in western France, but subsequent assays failed to corroborate the statement. Investigation, however, proved the presence of platinum in limonite in several localities in the Departments of Charente and Deux-Sèvres.[d]

In 1847 E. Gueymard, a French mining engineer, discovered the presence of platinum in tetrahedrite, which he found in metamorphic limestones on the mountain called Chapeau, above Chatelard, in the commune Champoleon, in the Vallée du Drac, Hautes Alpes. The limestone occurs in beds between protogine and a rock that appears to be related to spilite. The gray copper contains silver up to 12 per cent, and in addition antimony, lead, zinc, iron, sulphur, and a little arsenic. The gangue is dolomite, quartz, and barite, being very similar to the veins at Guadalcanal, Spain. M. Gueymard made a hundred analyses; 80 afforded no platinum, and in the remaining 20 the amount was not always large enough to weigh. His experiments were, however, subsequently verified in Paris, and of their reliable nature there seems to be no doubt. He extended his researches to St. Arey, near La Mure (Isère), and in the bournonite of the dolomites and of the altered limestones he identified platinum. Sometimes he could detect it in samples of 5 grams, and again he could not in samples of 20 grams, but it proved to be more commonly present than at Chapeau. A third locality was discovered in the Plan des Cavales, on the mountain of Rousses, Oisans, Isère. The country rock consists of protogine, gneiss, talc-schist, and some beds of Liassic limestone, now changed to dolomite and magnesian limestone. Here are situated old mines from which was obtained a foliated green carbonate of copper which carried 50 per cent Cu. This mineral yielded in two cases weighable amounts of platinum. Again, he discovered indications of platinum in slightly argentiferous gray copper and copper carbonate near Presles, on the right bank of the Bens, in Savoy.

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[a] The above notes upon platinum in Colombia have been drawn chiefly from a report which was made by Charles Bullman in 1890 for New York parties and which was privately printed. For the courtesy of its use the writer is indebted to Mr. A. W. Johnston, to whom acknowledgments are here made. In a modified form the general results of Mr. Bullman's examination also appear in the very valuable paper upon the Platinum Metals which he contributed to the Mineral Industry, Vol. I, p. 373. A description of the methods of gold washing will be found in the Engineering and Mining Journal, April 2, 1892, p. 347. Boussingault's paper appears in the Annales Chem. et Phys., Vol. XXXII, 1826, p. 204, and in Poggendorff's Annalen, Vol. VII, 1826, p. 515: Vol. X, 1827, p. 490.

[b] v. Zepharovitch, Mineralogisches Lexikon für Oesterreich, Vol. I, p. 318. See also Jahresber. Chem., 1847-48, pp. 1022 and 1152.

[c] A. Lacroix, Mineralogie de France Vol. II, p. 390.

[d] Dingler's Polytech. Journal, Vol XLIX, 1833, p. 232; Poggendorff's Annalen, Vol. XXXI, 1834, pp. 16 and 590; Phil. Mag., 1834, p. 158.

When M. Gueymard's samples were tested in Paris traces of rhodium and iridium were likewise identified. The amounts of the platinum metals are not, however, sufficient to justify mining.[a]

GERMANY.

A very interesting occurrence of allopalladium was early noted in the mines at Tilkerode, in the Hartz. It was at first thought that the mineral contained selenium, but the selenium was afterwards shown to be a mechanical mixture. The mineral was called eugenesite by Zinken. It contains palladium, silver, and gold.[b] The allopalladium occurs as microscopic six-sided scales on the gold of the Eskeborner shaft, together with quartz, selenide of lead, selenide of mercury, dolomite, and calcite. The mines at Tilkerode are based upon irregular lodes in diabase, or between it and neighboring slates.

Platinum has also been reported from the Siebengebirge[c] and from Freiberg.[d]

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[a] Mémoire historique sur la découverte du platine dans les Alpes, by E. Gueymard: Comptes rendus, Vol. XXIX, 1849, p. 814; Vol. XXXVIII, 1854, p. 941.

[b] Luedecke, Minerale des Harzes, p. 6.

[c] Berg- und Hüttenm. Zeitung, Vol. XIII, 1854, p. 232.

[d] *Idem*, Vol. VII, 1848, p. 628.

GREAT BRITAIN.

A few grains of platinum have been observed in the gold-bearing sands of Wicklow, in Ireland.[a] Some few scales have also been noted on the island of Jersey and in the sands at the mouth of the river Urr, Kirkcudbrightshire.[b]

RUSSIA.

It is a curious fact that platinum was not discovered in the Urals until nearly a hundred years after it had been brought to Europe from South America. It was, in fact, known to occur both in Colombia, Brazil, and in Santo Domingo before it was detected in the Rus-

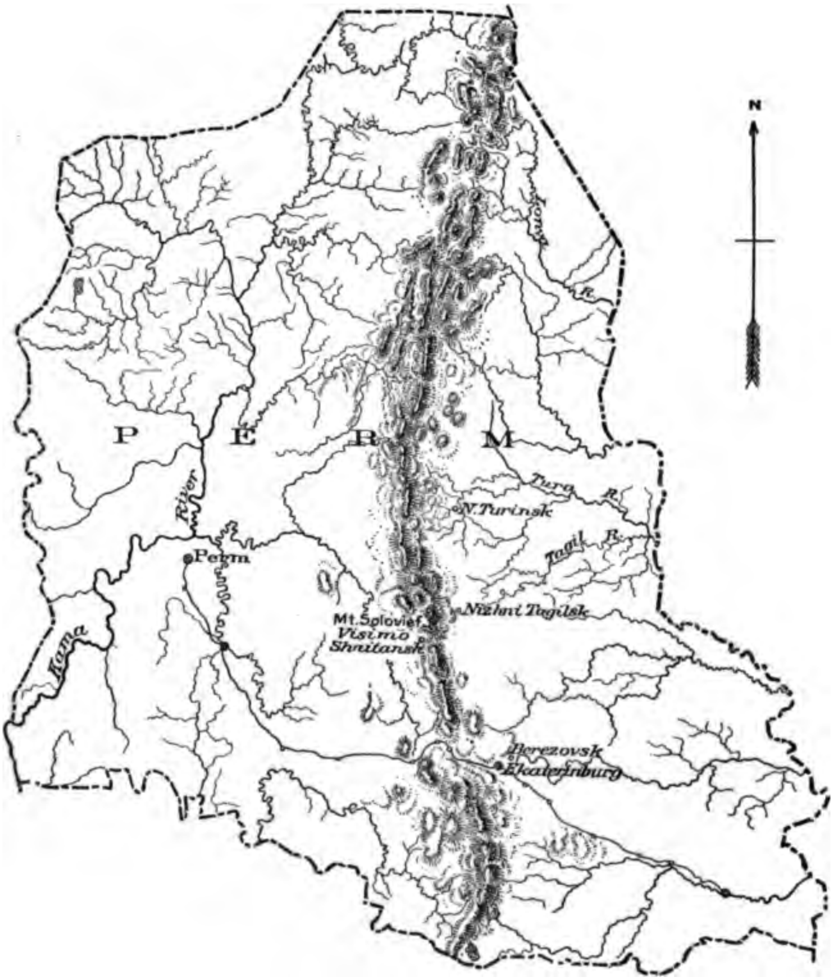

FIG. 4.—Map of Perm, Russia, showing the general geography of the platinum region.

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[a] W. Mallet, Philos. Mag., 3d series, Vol. XXXVII, p. 393.

[b] Greg and Lettsom, Mineralogy of Great Britain, 1858, p. 245.

sian gravels in 1819. It is possible that it was known at even a much earlier period in some of the gold washings of Bohemia, because certain old records are of such a character as to leave little doubt that the writers referred to platinum, and in Colombia in all probability it was known to the Spaniards in the first half of the sixteenth century.

The Russian sources of supply furnish nearly all the commercial platinum. Although the metal is known over a wide area, the really productive districts are comparatively limited. They lie along the eastern watershed of the Urals, in the eastern portion of the kingdom of Perm, and on the western watershed farther south. The boundary between European Russia and Siberia leaves the summits of the Urals north of the platinum district and runs off to the southeast, so that a large area of the eastern drainage is embraced in European Russia. A few years ago the greater part of the platinum came from the district of Nijni-Tagilsk, but at present the largest supply is obtained in the Goroblagodat and Bisersk districts, which are about 130 miles north.

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GOROBLAGODAT AND BISERSK DISTRICTS.

These two districts are situated northeast of the town of Nijni-Turinsk. From the watershed of the Urals two small rivers or creeks, called the Iss and the Veeya, flow eastward and enter the Tura River. They rise about 10 miles apart and preserve this general distance to their mouths. They are each about 30 to 40 miles long. The Tura, which is the main stream of the region, rises to the south near the Perm-Ekaterinburg Railroad. The Tura crosses the railroad near the village of Kooshva and pursues a northerly course of 35 miles until it meets the Iss. It then bears away 65 miles eastward to the town of Verkotoor, after which it swings around to the southeast and, crossing the boundary of the kingdom of Perm, flows past the well-known city of Tiumen and soon joins the Tobol River. The Tobol discharges into the Irtish, which empties into the Obi. The waters finally reach the Gulf of Obi and the Arctic Sea. The course of the Tura is in many respects similar to those of the Tulameen and Similkameen rivers of British Columbia, since all three flow north, northeast, and finally southeast. The productive platinum ground is found all along the Iss and the Veeya and on the Tura from its junction with these two streams as far as Verkotoor. The linear distance, therefore, is approximately 100 miles, and the general area is estimated at about 2,000 square miles.

Physiography.—In physiographic character the region is an old land area which has suffered protracted surface weathering and degradation. The drainage has reached a stage approximating a base-level or graded slope, and consequently the concentration of heavy minerals of all sorts, originally in a state of sparse dissemination in the country rock, has been extreme. This fact must be borne in mind in any comparison for economic purposes between the Urals and any other platinum region, such as, for example, British Columbia or the United States of Colombia. The rivers of the Urals appear to have been formerly larger than now, and the valleys are often choked and silted. The rivers meander, with many oxbows and cut-offs, across the level stretches.

Distribution of the platinum-bearing gravels.—Platinum is found in commercial quantity most richly along the Iss. The gravels are less rich along the Veeya and on the Tura. The two tributaries are undoubtedly responsible for the platinum in the Tura. The platinum is afforded by placers of the usual type, but on account of the former larger development of the drainage there are productive gravels away from the present streams and in abandoned channels which are more or less similar to those with which the gold seekers of our Western States are familiar. The productive ground extends, as a rule, to distances varying from 200 to 800 feet on each side of the present rivers. Along the broader parts of the Tura, Purington states that the total width of the productive ground may be half a mile, and that generally throughout the region he has obtained colors by panning, from the grass roots downward, but of course the richest streak lies est to the bed rock.

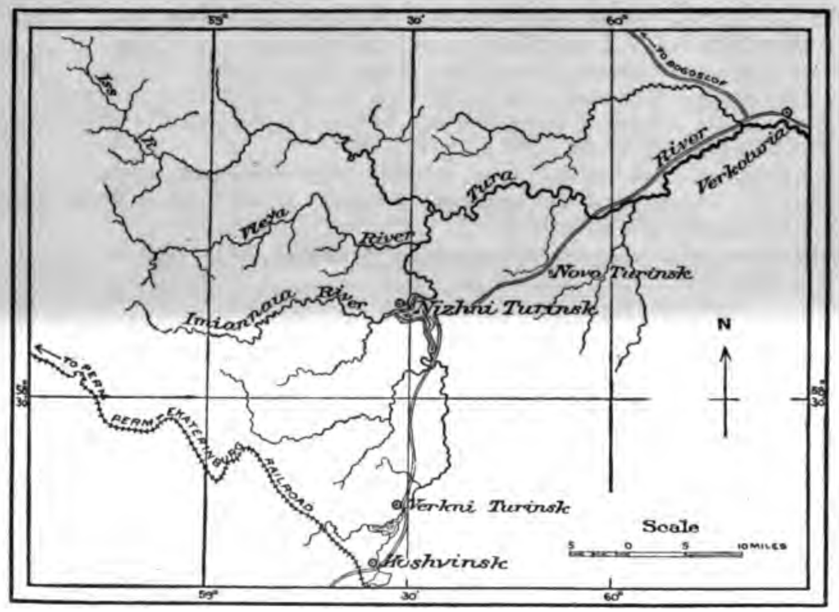

FIG. 5.—Sketch map of the platinum-bearing streams in the Goroblagodat and Bisersk districts, Russia. (After C. W. Purington.)

Hard geology.—The rock formations along the Iss and the Veeya are very suggestive of those in British Columbia, and the accompanying geological map (fig. 6), which is reduced from the valuable report of Prof. A. M. Saytzeff, will be useful for comparison with that earlier given for the Tulameen district. Near the headwaters of each stream are extensive outcrops of peridotite, which are associated with equally large areas of syenitic gneiss. There are smaller exposures of diorite, gabbro-diorite, and gabbro, all of which are represented by the same conventional sign on the map. Still farther downstream each creek passes into an area of porphyrites, within the limits of which are two associated exposures of Lower Devonian limestone. Beyond the junction of the Veeya and the Iss with the Tura the geology has not been colored on the map which accompanies Professor Saytzeff's report upon the platinum deposits, but the rock formations along the Tura seem to have no special connection with platinum, because the river derives all of its metal from its two tributaries. The fullest statement of geological details will be found in the paper by Professor Saytzeff, entitled Geological Investigations in the Nicholay-Pavdinsk district, which is subsequently cited in the bibliography. A brief outline, however, is here given regarding the several formations.

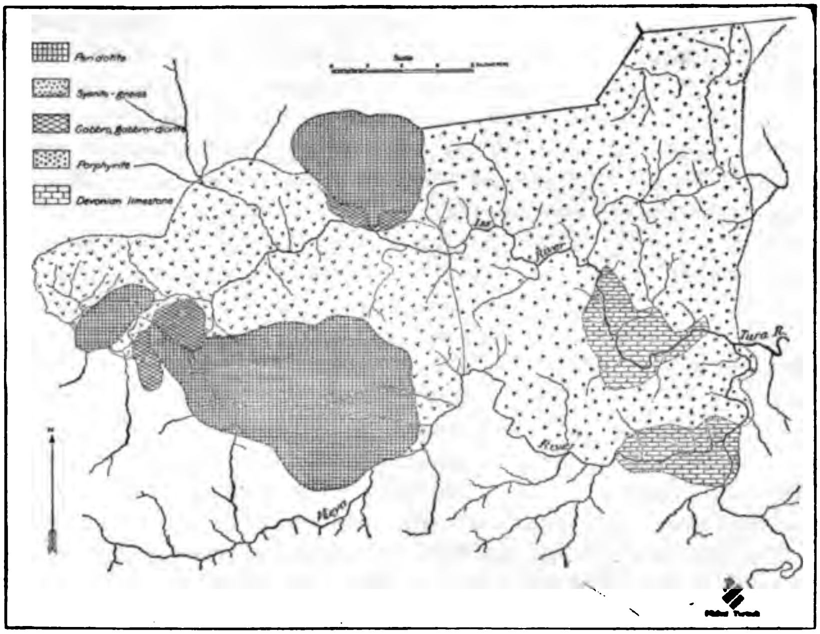

FIG. 6.—Geological map of the headwaters of the Iss and the Veeya rivers. (After a colored map by A. M. Saytzeff.)

The syenite-gneiss is, as a rule, coarsely crystalline and well foliated, but it sometimes exhibits a finely granular structure and may pass to massive types. In the coarse varieties the reddish feldspar and the dark-green hornblende can be readily identified. The rock is greenish gray in color and contains veins and nests of quartz.

Under the general name of peridotite a considerable variety of rocks is included, viz, peridotite, olivine-gabbro, olivine-diallage rock and rock composed chiefly of diallage, and serpentine. All of these are closely related and pass one into the other by transition. Similar ones occur likewise in the district of Nijni-Tagilsk.

The diorites, gabbro-diorites, and gabbros are all closely related to one another by transitions. Gabbro seems to have been the original from which the others have been derived by the metamorphism of the pyroxene to amphibole. The rocks also exhibit gnessoid structure at times.

The porphyrites are chiefly diabasic and uralitic.

In addition to the rocks mentioned, talc-schist has been discovered in the soil of one or two of the mines. The Lower Devonian limestone is a dark or light-gray variety, and in some places has a purple-red color. It is fine grained and has many veins of calcite, some of which contain cinnabar. Pebbles of cinnabar from the veins are found in the gravels together with the platinum where the limestone forms the bed rock. The dip of the limestone is steep, and the riffles and pockets formed by its passage across the creeks furnish some of the richest deposits. The limestone is penetrated by igneous dikes, which are thought by some observers to have a connection with the introduction of the cinnabar.

Mother rock of the platinum.—Professor Saytzeff has carried out some investigations in order to trace back the platinum to its mother rock. He concludes, from its association with chromite and with serpentine, that the peridotite is the chief source, but that the metal is present in the syenites and the gabbros. As regards the latter rocks the conclusions are based chiefly upon the association of the nuggets in some places exclusively with bowlders of these types. Platinum seems actually to have been found only in the bowlders of peridotite or its derived serpentine. Mr. Purington pounded up a sample of serpentine taken from the gravels and weighing about 20 pounds. He succeeded in panning scales of platinum worth about 2 cents from it. This would be equivalent to about $2, or from a seventh to an eighth of an ounce, per ton.

Placers.—The placers are of two varieties—those which are in the beds of the running streams and those which are now above water. The former seem to be chiefly dug by hand dredges, and, so far as the descriptions lead one to infer, wing dams, sluices, and the familiar contrivances of our Western States seem not to have been yet introduced. The gravels which occur above the rivers are worked throughout the district. On the land there is a general surface layer of peat or vegetable material called turf. Below this is a variable thickness of poor gravel, and then the pay streak is met. The overburden varies from

5 to 20 feet, and the pay streak is 4 feet and less. The overlying material is stripped off, and then the productive gravel is carted to the washers. Less frequently the productive gravel seems to be a saprolite, or crust of decomposed peridotite, as described by Professor Saytzeff. Gold accompanies the platinum in a very subordinate capacity. As is usual in our Western placers, clayey streaks give the best returns. Opposite the mouths of tributary brooks the platinum is often particularly rich. The valley of the Iss narrows and widens, and the best placers are found in the wider reaches, where the velocity of the stream becomes checked. Where there are hollows in the bed rock, more especially in the limestone, the concentration is often marked.

Fairly large bowlders are sometimes present along the Tura, but on the Iss they do not exceed 18 inches. Only the local rocks are represented by them, and, as a rule, they are but slightly rounded. The region has never been glaciated.

Mr. Purington gives some estimates of value which are based on statistics obtained from local authorities and from his own pannings. From the grass roots down, the gravels over the whole region will not yield over 40 cents to the cubic yard. Along the Upper Iss 63 cents is the estimated contents, and on the Lower Iss 65 cents, for an average of 10½ feet of gravel. Along the Tura the gravels, which are dredged in 7 feet of water, are estimated at 52 cents to the yard. These values would seem to be amply sufficient to afford a large margin of profit if, in other respects, the region is at all adapted to the methods of hydraulicking or dredging that have been developed in western North America.

In Professor Saytzeff's descriptions of the workings, many detailed cross sections of the gravels are given, together with pictures of the carts and washers. A description of the methods of working will also be found in Mr. Purington's recent paper, and those of the Nijni-Tagilsk region have been described and illustrated by Mr. G. F. Kunz and Prof. Henry Louis in papers to which reference will be subsequently made in the bibliography.

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NIJNI-TAGILSK DISTRICT.

The productive ground in this district is found about 22 kilometers, r about 18 miles, south-southwest of Nijni-Tagilsk. Platinum occurs on both the eastern and the western watershed, but it is obtained *more especially* on the western. The streams head in Mount Solo-

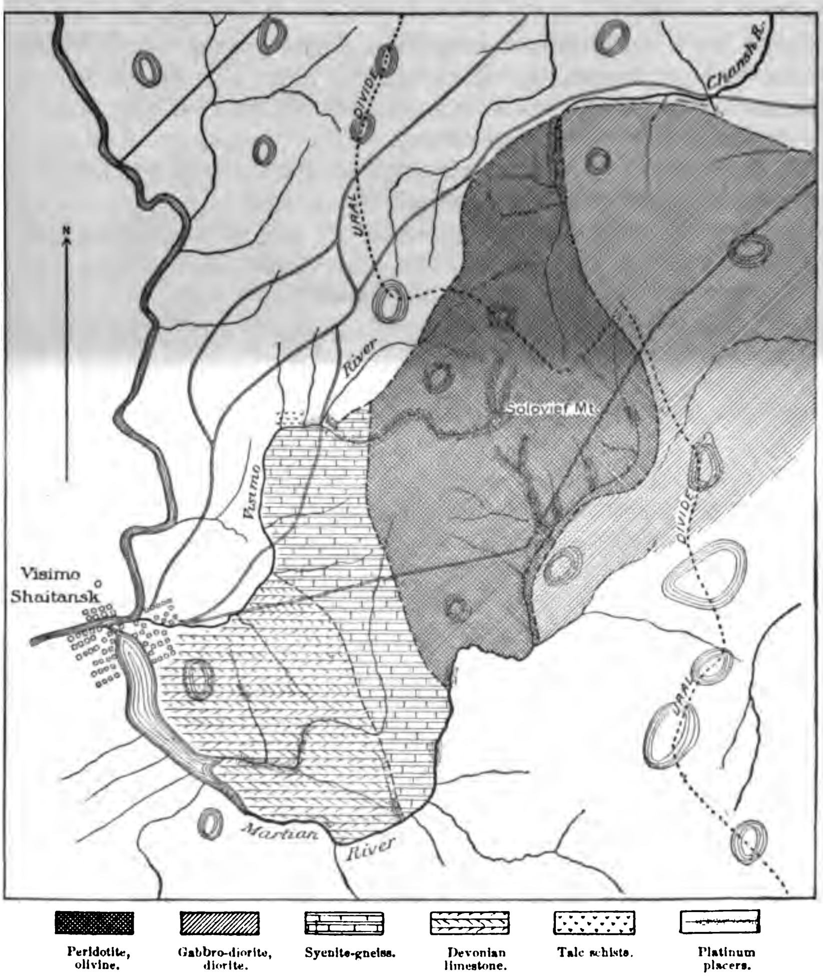

FIG. 7.—Geological map of the Nijni-Tagilsk platinum district. (After a colored map by A. M. Saytzeff.)

The Vissim, the Martian, and the Chansh (or Schaitansk) flow westward, while some of the headwaters of the Tagil, a tributary of the Tura, flow eastward. Mount Soloviev consists chiefly of peridotites, but it has associated with them the same gabbros, diorites, syenitic gneisses, and Devonian limestones which have already been mentioned under the northern district. The accompanying geological map, taken from Professor Saytzeff's paper, will give an idea of the geological relations. In their petrographic characters the rocks seem to be much the same as in the northern districts. The peridotite has, however, been somewhat fully described by Inostranzeff in connection with his investigations of the mother rock. A full translation of Professor Inostranzeff's paper is given on subsequent pages, and in it an outline of the peridotites will be found. The accompanying photomicrograph (Pl. VI, *C*) has been prepared from a specimen which was gathered in the region by Dr. G. P. Merrill in 1897, and which has been very kindly placed in the hands of the writer.

In connection with an investigation of the bowlders which had been observed to contain platinum, Daubrée has given an analysis of a specimen of the peridotite, as follows:

Analysis of peridotite from Mount Soloviev.

SiO_2	47.60
Al_2O_3	3
Fe_2O_3 and FeO	7.60
MgO	26
CaO	11.30
Loss on ignition	4.30
Total	99.80

Under the microscope it consisted of diallage, olivine, veins of serpentine, and chromite. Some small scales of platinum were noted in the rock.[a] It is interesting to compare this analysis with the analysis of the mother rock from British Columbia, p. 44.

In addition to the pocket of platinum-bearing rock which is described by Professor Inostranzeff, Prof. Henry Louis has mentioned a streak of serpentinized rock which was 6 feet wide and which was actually mined to a depth of 35 feet. It was crushed and washed, and yielded 15 dwt. per ton. Below 35 feet the values gave out.[b]

Placers.—As already stated, the placers lie mostly on the western watershed and are found over an area of about 80 square miles. They are similar in character to those described in the region farther north. The gravels are often from 30 to 40 or even 60 feet deep, and the pay streak lies upon the bed rock, and is 6 to 10 inches thick. Sometimes, however, another pay streak will be found part way down. The richest layers are somewhat irregular in shape and distribution. When next the bed rock they are usually attacked by shafts, from which the miners burrow out and through which they bring the gravels to the shaft and finally to the surface. The mining is done in the winter and the washing in the summer. The gravels are broken up by puddling machines and washed by being passed through sluices with riffles. A brief account of the methods of mining will be found in the paper by Mr. G. F. Kunz in the report on Mineral Industry of the Eleventh Census, page 341. The largest nuggets are obtained in this region, but the platinum is less pure than that gathered along the Iss. It is angular and of darker color and contains more iron, whereas along the Iss it is light colored, and is more apt to be in scales, especially when it is obtained at some distance from the mother rock. Many analyses of Russian platinum are given on pages 18–19.

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[a] Comptes rendus, Vol. LXXX, 1875, p. 707.

[b] The Mineral Industry, Vol. VI, p. 542.

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PRIMARY DEPOSITS OF PLATINUM IN THE URALS

By A. INOSTRANZEFF.[a]

Originally discovered in South America, platinum was brought to Europe in 1735,[b] and was recognized by Shaeffer as an element in 1752. Notwithstanding the fact that it was discovered so long ago, it has been extracted up to the present only from placers, and its original place of formation has been unknown. It is true that, as a mineral disseminated in hard serpentine rocks, platinum has been found in the mountains of Brazil and in the Cordilleras of North America,[a] but in such minute quantities that these discoveries could hardly be regarded as proving the original place of growth of the nuggets.

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[a] Reported at the meeting of the department of geology and mineralogy of the St. Petersburg Society of Naturalists, November 7, 1892. (Translated from the Russian.)

Table of Russian weights.

1 poud = 40 funts = 36 pounds avoirdupois.
1 funt = 96 zolotniks = 0.9 pound avoirdupois.
1 zolotnik = 96 dolei = 0.0094 pound avoirdupois.

[b] *Dana, Mineralogy.*

In Russia platinum was first found in the gold mines of Dakovlev in 1819,[b] later in the sands of Neviansk, Bilimbayevsk (1822), and Kuvshinsk factories (1824); and finally, in 1825, the richest Ural sands of the Sucho-Vissimsk works in the district of Nijni-Tagilsk were discovered.

According to Gustav Rose,[c] platinum occurs in the central and southern parts of the Urals, as well as in the northern, eastern, and western slopes. In the majority of places it is met in small quantities, associated with native gold. Only in the sands of the Nijni-Tagilsk works is platinum found in considerable quantity, and it is usually not associated with gold.

A study of Russian platinum has been made by many scientists, and a concise statement, enlarged by personal observations, may be found in an article by H. T. Koksharov,[d] in which he makes the following remarks: "The original place of deposition of platinum in the Urals has not been found as yet, but judging from the samples of native (virgin) platinum, in which can be seen adhering chromic iron, and sometimes, although seldom, serpentine, it should be sought for in the latter, as mentioned by Rose, because in serpentine chromic iron occurs in masses.

Daubrée,[e] in his experiments with the samples of the country rocks furnished him by Jaunez de Sponville from the mines of Tagilsk, found in them platinum associated with olivine, serpentine, and chromic iron. A close relation between the platinum of the sands and that of the rocks which contain olivine was determined by the same scientist in New Zealand, where the mines form a part of the Dun Mountains. This mountain is composed of a rock in which olivine predominates, and which was called "dunite" by Hochstetter. Daubrée observed a like relation of platinum sands to serpentine in the island of Borneo.

This summer I had occasion to travel in the Urals and to visit several places well known to geologists, among which were the mountainous district of Tagilsk, containing most interesting platinum mines. They are situated southwest of the Nijni-Tagilsk factory, along the rivers Vissim, Martian, and Chansh, on the western slope of the Urals. As has been known for a long time, the soil of the Tagilsk platinum mines, as well as a considerable part of the fragments found there, consists of serpentine and olivine rocks. There are also metamorphic schists and a peculiar conglomerate, which is developed in the neighborhood, consisting of fragments of serpentine and olivine rock and chromic iron, held together by a lime cement.

The platinum occurs in the sands in grains, and frequently in nuggets. [The largest found weighs 23.5 funts—21.15 pounds.] On washing the slimes, gold, iridium, and osmium are found.

The Tagilsk platinum mines are located along the rivers Vissim, Martian, and Chansh, which rise in the mountain Soloviev. The distribution of the platinum around about the Soloviev Mountain suggested long ago the advisability of searching in the mountain for its original source, but all prospecting has remained fruitless. At the time of my visit to the Tagilsk mines I had the opportunity of witnessing the discovery of the original place of deposition of platinum in the Urals. This discovery, like many others, was due to a laborer who had no license to perform any work there, but did it on his own account. Such persons are known in Siberia as plunderers or pillagers.

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[a] Mining Journal, 1891, Book III, p. 324.

[b] Minchin, Chemical analysis of the different kinds of Uralitic platinum: Trans. Min. Soc., Part II, 1842, p. 101.

[c] Reise nach dem Ural, dem Altai und dem Kaspischen Meere, Vol. II, 1837.

[d] Materials for the Mineralogy of Russia.

[e] Daubrée, Association de platine natif à des roches à base de peridot, Paris, 1876.

The manager of the platinum mines, Mr. Costenetzky, learned that
ern part of the Soloviev Mountain such a plunderer was excavati
and that this rock was being crushed and washed in a neighboring
plunderer noticed that he was being watched and ran away. It w
impossible to know whether he actually obtained platinum or a
This circumstance, however, led the manager to begin a reconnai
locality. Through the kindness of the Tagilsk administration and M
ilton, some of the rock where the laborer had conducted his work was
dynamite, and on the freshly formed surface could be seen the fo
massive rock in its fresh fracture appeared blackish green, with poly
ings. The portions along the crevices were of a whitish-yellow co
rounded the cleavage planes like a band, giving the appearance of an
of rock. In the place where the laborer conducted his work there w
a pocket, 35 cm. in diameter, which extended deep into the rock.

As compared with the native rock, this rock appeared, when fres
less compact nature, and could be quite easily split to pieces with a
left in the air it would harden. In some places this rock was very
altered surface of the native rock, while in others it was directly in
the fresh, unaltered country rock. Besides, between the pockets there
separate small pieces of the native country rock. The rock containi
ets consists principally of chromic iron, serpentine, and dolomite, the
of which is in small quantities in the form of cement, and a still les
of opaline silica, which appears sometimes as a spheroidal mass.

In connection with the distribution of the serpentine and the ch
may be noticed that they are frequently in layers parallel to the pla
with the neighboring country rock.

This method of distribution reminds one of the distribution of s
some of the ophicalcites.

The country rock is of a finely granular texture, and in thin secti
observe with a microscope transparent greenish grains of olivine, w
make up the mass of the rock. The bands consist of rock partly u
partly altered through the process of superficial change to the yellowis

Under the microscope the wall rock exhibits crystallized grains
olivine of varying size and with a characteristic shagreen surface.
were grouped so that, with the binding mass, they represented a he
tour, and their outline resembled the section of a crystal of olivine.
that binds these grains together is a light-green serpentine, distribute
veins which have a foliated structure. Through the serpentine is d
a little chromic iron, which appears by reflected light to have a dul
is more in evidence in places where some of the material crumbled
paring the sample for examination. The olivine predominates over the
In polarized light the olivine exhibits strong interference colors.
under the same conditions reveals a granular structure. But in s
one may detect with polarized light sporadic inclusions of grains of do
treating the substance with H_2SO_4 the acid dissolves a considerable
iron and attacks the olivine, removing it and separating out an amorp
In this reaction the serpentine loses its original color and is darken
grains of dolomite are completely dissolved. Being guided by the pri
ponent parts of the country rock of the Soloviev Mountain—that is,
chromic iron—and considering serpentine as a product of the change
by olivine, one sees clearly that the serpentine has been derived from th
of peridotite which is called dunite.

Comparing this rock with the real dunites of other countries, we see
difference, viz, that the latter consist almost entirely of olivine, wh
former there is some serpentine, which has undoubtedly been produ

olivine by metamorphic processes, as is shown by the hexagonal section occupied by separate fragments of olivine all bound together by serpentine.

Such a rock might be called paleodunite; but we must not overlook the fact that in the olivine rocks several are connected by transition, and the decrease of one of the component parts in one rock may lead to its transition into the other. Thus the presence of enstatite makes a special variety, but it may decrease in amount almost to disappearance. Such a rock was described by Wadsworth[a] under the name saxonite, but Rosenbusch[b] did not accept the name, and renamed it harzburgite.

Nevertheless, the description of saxonite, furnished by Wadsworth and illustrated in Pl. IV, fig. 4, of his work, reminds us of the rock of the Soloviev Mountain, with only the difference that in the latter no enstatite was disclosed and there is considerably more olivine than in saxonite (harzburgite).

Under the microscope the rock with pockets appears to consist of many irregular angular grains of chromic iron, and to be fractured and have many cavities. The cementing material between the grains of chromite is chiefly serpentine, and in lesser quantity dolomite and opal, the last named sometimes in beautiful spheroidal masses. The last two minerals penetrate the crevices and cavities of the chromic iron.[c] In reflected light the chromic iron exhibits a weak, black, shining metallic luster; but no other minerals with a metallic luster can be seen. A few pieces of the rock (with pockets) could be observed, by means of a strong magnifier, to contain exceedingly fine grains or leaves of native platinum disseminated in the chromic iron. This search for it, by the way, was very difficult on account of the presence of the hollows in the seams of the chromic iron, which in a certain position before the light gave an exceedingly strong luster.

To determine the presence of platinum in the rocks (with pockets) in which the platinum could not be seen by means of a microscope, about 14 funts (5,733 grams) of it was taken from the place of blasting, crushed, and carefully washed. On obtaining the slime in the iron pan used in the washing, under the water there was observed a thin silvery band of native platinum, which was difficult to separate from the chromic iron by continuous washing on account of the danger of losing the fine microscopic leaves.

On examining the slime, even with a strong magnifying glass, no platinum was found. The examination was interfered with largely by the mass of angular grains of chromic iron, which possesses a strong, metallic, glassy luster, and by the size of the platinum, which was microscopically minute. The quantity of concentrates obtained in this experiment was 25 grams, and in order to find the chemically pure platinum, the following method was adopted. The concentrates were treated with aqua regia, the solution each time being evaporated to dryness on a water bath; the residue was then treated with sulphuric acid twice and again evaporated to dryness on a water bath. The residue was then treated with absolute alcohol, filtered, and to the clear solution was added solid ammonium chloride in excess. The solution was then slightly warmed and ammonium chloroplatinate precipitated. The precipitate was then filtered out and dried in the filter, ignited, and weighed in a porcelain crucible.[d] The platinum obtained was then treated with aqua regia, in which it dissolved completely, thus proving the absence of iridium. The solution was evaporated to dryness in a water bath, the residue treated twice with sulphuric acid, and again evaporated to dryness. After washing the residue, a few qualitative tests were made. A part of the solution was reduced by zinc, and chemically pure platinum was obtained. This was tested with platinum iodide, for the characteristic platinum reaction, and afforded a rose-crimson color.[a] In all, 0.0644 gram of chemically pure platinum was obtained from the slime, or considering the weight of the whole quantity of rock employed in this experiment (5,733 grams), it produced 0.00112 per cent of platinum.

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[a] M. E. Wadsworth, Lithological Studies, 1884, p. 125.

[b] Rosenbusch. Mikroskopische Physiographie, 2d edition, 1887, p. 269.

[c] H. J. Joss, who came at the time of my return from the platinum mines in Tagilsk, brought several samples of native rock to St. Petersburg. These samples were shown at the meetings of several scientific societies of the city.

[d] In all my experiments with platinum, no platinum apparatus of any kind was used. All solutions, ignitions, and weighing were made in porcelain apparatus.

Bearing in mind the fact that the platinum is found here in exceedingly fine particles, we might justly suppose that in the rough washing which was performed a part of the platinum was carried away by the water, and that the given figure is probably below the correct one. In order to obtain an accurate result, 500 grams of the rock was crushed and carefully mixed, and from this was taken 100 grams, which was treated twice with aqua regia. This solution was carefully evaporated to dryness on a water bath and the residue treated with sulphuric acid twice, with repeated evaporation. Then the residue of silicic acid was filtered out. The filtrate was again evaporated to dryness on a water bath and the residue dissolved in alcohol. Slightly warming this solution with chloride of ammonium, just as in the previous experiment, a precipitate of ammonium chloroplatinate appeared. This was collected on a filter, rinsed, dried, and by ignition converted into chemically pure platinum, amounting to 0.0103 gram, or 0.0103 per cent of the rock. This platinum was treated qualitatively in the same way as that obtained from the concentrates.

From the same 500 grams of the crushed rock another 100 grams was taken and treated with aqua regia six times. In this operation 35 grams of the rock went into solution. The filtrate was separated first with an excess of sulphuric acid, then with water to dryness on a water bath. The solution in water, with the addition of a little sulphuric acid, was filtered from the precipitate. The platinum was reduced by zinc, collected on the filter, washed, and dried. The filter was then burned and the platinum weighed, amounting to 0.0111 gram, a quantity nearly the same as that obtained with ammonium chloroplatinate (0.0103 gram). Therefore the average amount of chemically pure platinum contained in the rocks may be taken as 0.0107 per cent.

Comparing the results of the last experiment with the determination of platinum in the concentrates, it is evident that in washing the crushed rock there was a loss of platinum, first because the water carried some away; and, secondly, for the reason that in 14 funts of the material used it was difficult to pick out only the rock with pockets. Some of the native olivine rock was present and thus reduced the percentage of the metal.

Rock containing platinum is found in the pockets, with dunite, although the metal occurs in an exceedingly fine state. Platinum is usually associated with other precious metals, such as gold, silver, iridium, osmium, etc., and the deposits in these mountain rocks are no exception to the general mode of occurrence. The amount of platinum is somewhat sporadically distributed, at one time enriching the accompanying rock and at another decreasing to complete disappearance. Of course we have a right to suppose that platinum is sporadically disseminated in its native rock, and it is possible that the laborer had already worked out that part of the pocket in which the platinum was not of microscopic size nor in sparsely distributed condition. This fact also points to the finding of platinum in the sand, in which it can be seen with the naked eye, disseminated in chromic iron. Of course the continuation of the investigation in the Soloviev Mountain must disclose such pockets, and it is not improbable that veins will be discovered in considerable number. It may be that in this rock (with pockets) will be found microscopic particles of platinum which can be extracted by washing, although now it can be extracted only by chemical means.

The place of discovery, at all events, contains a considerable quantity of the metal, and, expressing it in the ordinary way, it is 41 zolotniks to every 100 poods of rock. At the present time in the Tagilsk platinum mines rock is being worked which contains 2½-12 zolotniks per 100 poods.

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[a] Annales de Chemie et de Physique, 1832.

From further investigation we may expect some additional information to that reported by myself. But, in all events, 150 years had elapsed before the original place of deposition of platinum was discovered. Speculations, as expressed by different investigators, concerning this mountain rock which contains the precious metal, are now out of place. There is no doubt that the original source of platinum is peridotite, to which future investigations in the different parts of the Urals, one of the most interesting regions in the world, should be confined.

PLATINUM ELSEWHERE IN RUSSIA.

Platinum has been reported in a number of other places in the Russian Empire. Federov has mentioned its occurrence, together with gold, in the extreme north of the kingdom of Perm, along the Loswe River and its tributaries. Syenitic gneiss seems to be the prevailing country rock.[a] Platinum is said to occur along the Ivalo River in Lapland, associated with diamonds and probably derived from a peridotite.[b]

Platinum is said to have been found in traces in the province of Baikal and Yenisei, Siberia.[c]

Palladium has been reported by T. W. Wilm in the gold-bearing sands on the south coast of the Black Sea. It is stated that it constitutes 8 to 10 per cent of the concentrates.[d]

Platinum is said by J. A. Phillips[e] to occur in small quantities in the auriferous quartz of the Beresovsk gold mines. Beresovsk lies a few miles northeast of Nijni-Tagilsk.

SPAIN.

One of the most interesting discoveries in connection with platinum was made early in the last century by the French chemist Vauquelin. He received a suite of ores from a silver mine at Guadalcanal, a few miles northeast of the Rio Tinto district, Seville. The ore resembled tetrahedrite closely, and on analysis was found to contain copper, lead, antimony, iron, sulphur, silver, and sometimes arsenic. It was associated with a gangue of calcite, barite, and quartz. The platinum proved to be variable, reaching at times 10 per cent and again being present only in traces. The same was true of the silver.[f] The silver mines of Guadalcanal are situated north of the city of Seville. The country rock is mica-shist, and the mines were formerly very productive, but are now of little importance.[g]

This discovery of platinum in a mineral containing copper, together with antimony and sometimes arsenic, and in an undoubted vein, is extremely interesting and important. Reference may be here made to the additional occurrence of platinum with tetrahedrite in the Alps and the neighboring parts of France, as is described under "France," p. 65. The similar occurrence of platinum in the form of sperrylite in the Sudbury region of Ontario may be likewise mentioned in this connection, and the ore at the Rambler mine, Wyoming.

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[a] Mineralogisches aus dem nördlichen Ural, by E. V. Federov: Tschermaks mineral. Mittheil. Vol. XIV, 1894, pp. 85, 143.

[b] A. E. Nordenskjöld, Poggendorffs Annalen, Vol. CXL, 1870, p. 336.

[c] Notice explicative sur la carte minéralogique de la Siberie (prepared for the Paris Exposition, 1900), p. 10.

[d] T. W. Wilm, Russ. Phys. Chem. Gesell., St. Petersburg, March, 1893.

[e] Treatise on Ore Deposits, 2d edition, pp. 545-546.

[f] Notice sur l'existence du platine dans les mines d'argent de Guadalcanal en Estramadura: Annales de Chemie, Vol. LX, 1806, p. 317.

[g] Ore Deposits, by J. A. Phillips, 1896, p. 493.

AFRICA.

ALGIERS.

The only mention of platinum in Africa that has been met by the writer is a brief note by G. Aimé upon an occurrence of galena at a place called La Bouzaria, a few miles from the city of Algiers. The communication was made to the French Academy and the sample was handed to MM. Berthier and Becquerel for verification of the reported presence of platinum, but the results of their assay have not been found.[a]

ASIA AND THE EAST INDIES.

BORNEO.

Platinum was discovered in 1831 in the gold washings of Goenoeng Lawack, southeastern Borneo. The gravels occur in a hilly country. Their bowlders are diorite, syenite, copper, and fragments of quartz, which are mingled with a sand of quartz and magnetite. They range from several feet to several fathoms in thickness, and toward the coast are buried beneath marshes. Cinnabar is said to accompany the grains. When analyzed, samples afforded the following results:

Analyses of platinum nuggets from southeastern Borneo.

	1	2	3
Pt	70.21	71.870	82.60
Ir	6.13	7.920	.66
Rh	.50	1.286	....
Pd	1.44		
Os	1.15	.480	.30
Au	3.97	....	.20
Fe	5.80	5.866	10.67
Cu	.34	.430	.13
Iridosmine	8.83	8.430	3.80
Hg	....	.658	....
Fe_2O_3	1.13	.420	....
Cu	.50	....	....
Insol	....	2.240	....
Loss	....	.400	....
Total	100.00	100.000	98.36

NOTES TO TABLE.

1 and 2. Bleekrode, Platinerz von Borneo: Poggendoff's Annalen, Vol. CIII, p. 656. Platinerz von Goenoeng Lawack auf Borneo: Idem, Vol. CVII, p. 189.

3. M. Bocking, Liebig's Annalen, Vol. XCVI, 1855, p. 243.

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[a] *Minéral* de plomb sulfuré d'Alger, by G. Aimé: Comptes rendus, Vol. VII, 1838, p. 246.

The Fe_2O_3 and Cu mentioned at the end of the analysis were insoluble in HCl.

The following microscopic minerals occur with the platinum grains: Topaz, zircon, ruby(?), diamond, quartz, and feldspar, but no ilmenite.

According to L. Horner the gravels occur in the drainage area of the Banjermassing River, which rises in the Ratoos Mountains. The mountains consist of serpentine, diorite, and gabbro. A red clay lies at their bases and contains the gravels which hold the gold and platinum. The platinum is to the gold as 1 to 10, but at the time of Horner's observations it was thrown away. He estimates that 10,000 ounces were being lost yearly (1842).[a]

BURMA.

Platinum has long been known as an associate of gold in the placers that are washed near Ava, in Upper Burma. The locality does not, however, appear to be commercially productive.[b]

JAPAN.

In a catalogue of the minerals of Japan in the collection of Mr. T. Tsunashiro for the Paris Exposition platinum and iridosmine are reported as occurring in grains in the sands of the river Yubari, Ishikari.

AUSTRALIA AND OCEANIA.

NEW CALEDONIA.

Scales of platinum have been observed in the gold-bearing sands of Andam Creek, below Boudé.[c]

NEW SOUTH WALES.

Platinum has been discovered in several localities in New South Wales. The one which first attracted attention is in the northeastern corner of the province, on the seacoast, between the mouths of the Richmond and Clarence rivers. For many years the sands have been washed for gold. More or less platinum occurs as well, and from time to time a few ounces have been saved. It is, however, of no great economic importance.

In 1889 platinum was discovered in some peculiar deposits near Broken Hill, the famous lead-silver camp, in the extreme western part of the province. In the course of a few years the matter was carefully investigated, more particularly by Mr. J. B. Jaquet. In the platinum-bearing localities the country rock consists of schists, gneisses, and quartzites, all of which are highly altered sediments of Lower Silurian age. They have been penetrated by dikes and bosses of granite and very basic diorite. Some serpentine likewise occurs within 6 or 7 miles. The platinum has been detected in a very peculiar ferruginous deposit, which is similar to the gossan of the normal vein. These gossany outcrops are irregular and never extensive. They cap the altered sediments and eruptive rocks alike, and no definite law of distribution can be detected, but at times they certainly are situated at the junction of a compact and a more loosely textured rock. As they are followed down, the ferruginous character diminishes, and the deposit passes into ferruginous clays, and these

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[a] L. Horner, Poggendorff's Annalen, Vol. LV, 1842, p. 526. In Beck's Erzlagerstätten there is cited a paper by T. H. Posewitz, Das Diamanten-Vorkommen in Borneo: Jahrbuch K. Ungar. Landesanstalt, Vol. VII. It is not accessible to the writer.

[b] J. Prinsep, Poggendorff's Annalen, Vol. XXXIV, 1835, p. 380; A. Faber, Pharmac. Centralblatt, 1848, p. 569.

[c] Pelatan, Les mines de la Nouvelle Calédonie, Paris, 1892, p. 53. This citation is quoted from A. Lacroix, Mineralogie de France, Vol. II, p. 390.

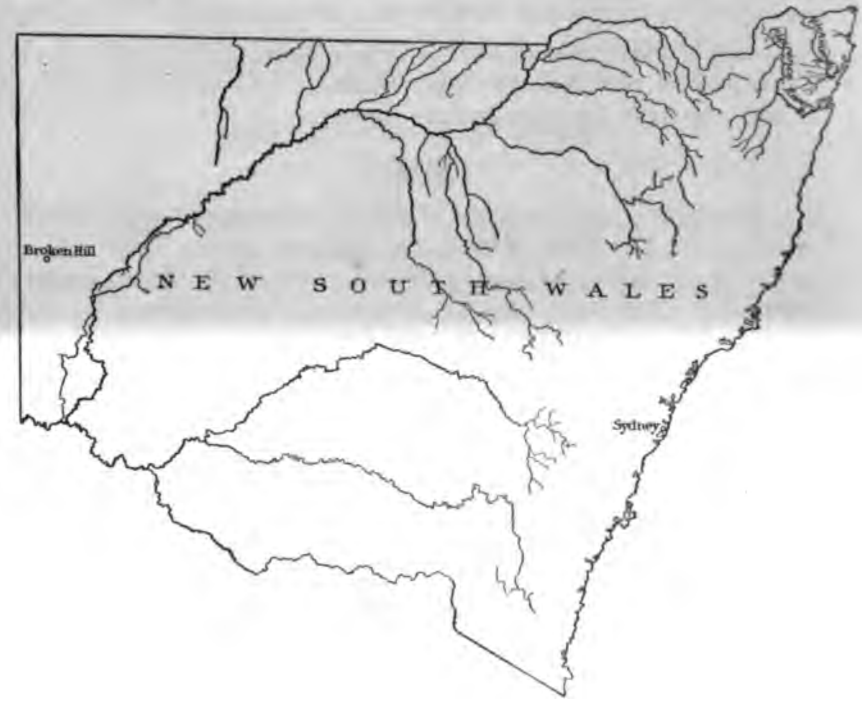

FIG. 8.—Sketch map of New South Wales, showing the distribution of platinum.

into granules of silica cemented with kaolin, or into kaolin itself. Decomposed feldspathic rock ensues, which may represent either gneiss or a portion of a granite dike. There are no defined walls. The platinum-bearing rock passes gradually into the others. The platinum occurs distributed through the decomposed material, but more abundantly in the clays and kaolins than in the iron cap. Shafts have been sunk to a depth of 20 feet, and many assays have been made. The yield is extremely variable, but it may be said to range from an ounce and a half down to a quarter of an ounce or less per ton. Copper has been met in some of the outcrops, but no traces of copper pyrites or other iron or copper sulphide ores have been found.

No platinum has been detected by the eye. It is so extremely fine that it is known only by assay. Mr. Jaquet states that there is no analogy between these deposits and well-defined lodes. He concludes that they have been produced by springs, which issued at one time where the deposits are now found. Iron, copper, and platinum were thus probably carried to the surface. The iron and copper were precipitated by the oxidizing action of the atmosphere, but the platinum was absorbed by the clays and kaolin. Platinum is not known, however, beyond a few feet in depth.

This occurrence is a most extraordinary and interesting one, and proves beyond question that platinum is not limited to placers, nor, indeed, to basic igneous rocks. If Mr. Jaquet's conclusions are correct it would certainly seem to be demonstrated that platinum circulates in solution. Some years after the above discovery platinum was found in commercial quantity in the deep placers of Fifield. The country rocks at Fifield are Silurian and Devonian. Silurian slates have been penetrated by diorite, which consists of hornblende, plagioclase, and accessory sphene and quartz. One gold-bearing reef has been located in the diorite. The gold and platinum bearing gravels form a lead from 60 to 150 feet wide, which extends for a little over a mile. They are covered by 60 to 70 feet of loam, with occasional bands of barren quartz conglomerates. The platinum and gold occur as small waterworn grains in crevices in the bed rock and in the few inches of sand just above it. The nuggets range up to 5 dwt. It

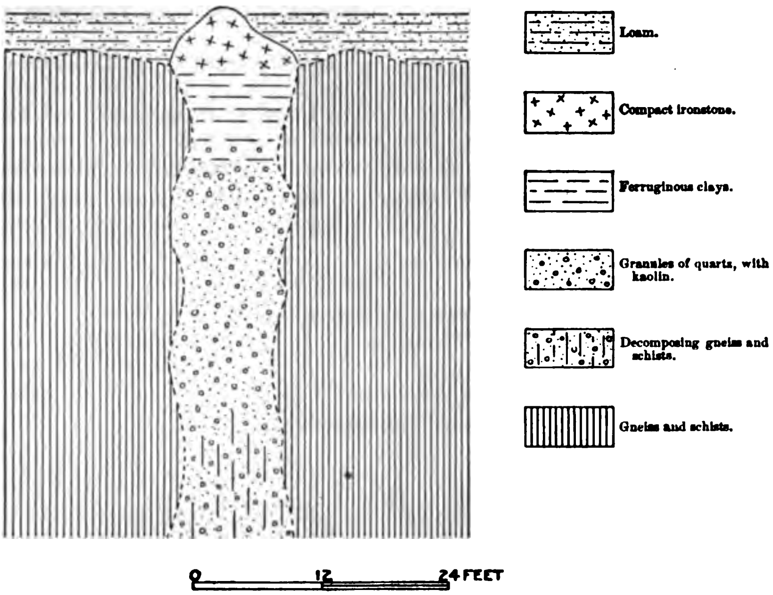

FIG. 9.—Geological section of the platinum deposit near Broken Hill, New South Wales. (After J. M. Jaquet.)

is thought by Mr. Jaquet that the platinum and gold have been concentrated from the neighboring conglomerates, which are supposed to be Tertiary.

Platinum has also been discovered as a rare mineral in a few additional gold washings in the colony.

For a general list of papers bearing upon the economic resources of New South Wales, see the bibliography prepared by W. S. Dun, which has been published in the Records of the Geological Survey of New South Wales, Vol. VI, Part IV, pp. 183–357. For platinum, see more especially pp. 312–314. In this place only the more important papers will be mentioned:

On the beach sands, see the Records of the Geological Survey of New South Wales, Vol. IV, Part I, page 25; also Proceedings of the Royal Society of New South Wales, Vol. XXVI, p. 368. Brief notices appear in the Annual Reports of the Department of Mines and Agriculture.

On the deposit near Broken Hill, see J. B. Jaquet, Report of the Department of Mines and Agriculture for 1892, p. 143, and the Records of the Geological Survey of New South Wales, Vol. V, 1896, p. 33. An abstract appears in Zeitschr. für prak. Geologie, 1893, p. 322.

On the Fifield deposits, see G. W. Card, Records of the Geological Survey of New South Wales, Vol. IV, p. 130; also J. B. Jaquet, Report of the Department of Mines and Agriculture, 1895, p. 181, and Records of the Geological Survey of New South Wales, Vol. V, p. 34.

Attention should be directed at this point to the remarkable occurrence of platinum in Australian coals which is described earlier in this paper (p. 35). It is not known to the writer from which one of the colonies the coal was obtained.

NEW ZEALAND.

Platinum has been found over a considerable area in New Zealand almost entirely in connection with the gold washings. It occurs in the eastern part of Middle Island, on the Cluthe River, and in a few gold districts of the Nelson region in the northern part of Middle Island. Iridosmine is frequent in the latter. It was noticed in this district by von Hochstetter. Some small scales of iridosmine were brought back by him from the Takaka diggings. The occurrence of the metal in this district is of extreme interest when taken in connection with the country rocks of the Urals and of British Columbia. As is well known, Baron von Hochstetter discovered in the Dun Mountains, near Nelson, the very peculiar rock, consisting of olivine and chromite, which he named dunite. It is almost exactly the same in mineralogical composition and texture as the chief mother rock which has been found in the other two platinum districts just cited.

One other interesting feature of the New Zealand gravels is the occurrence of bits of nickel-irons in association with the platinum. Like it they appear to be excessively basic segregations in igneous rocks. In the Zeitschrift für praktische Geologie for June, 1898, p.

222, a stray paragraph appears in which it is stated that in the Nelson district of New Zealand platinum has been found in an eruptive rock near the Takaka River. The eruptive breaks through limestone and the quantity is not commercial, but further particulars of the original source of the statement are not given.

Cox, S. H., Notes on Mineralogy of New Zealand; Trans. New Zealand Institute, September to November, 1881.
HAMILTON, W. S. On platinum crystals in the iron sands of the Orepuki gold field: Trans. New Zealand Institute, Vol. XVIII, p. 402.
HOCHSTETTER, F. M. Geologie von Neu-Seeland, Vol. I, 1864, p. 212.

TASMANIA.

Within the last few years the iridosmine which has been discovered in the gold placers of western Tasmania has assumed commercial importance. The need of osmium for certain forms of incandescent burners had brought these placers into notice. Montgomery states that a good deal of platiniridium and iridium is obtained along the Savage River, having probably been derived from the serpentine which is known upstream. Platinum itself is reported from the Wilson River, and osmiridium, containing, however, very little osmium, from parts of the King River gold field and the Salisbury field, near Beaconsfield. The original matrix has not been discovered.[a]

CONCLUSION.

A careful review of the facts set forth in the preceding pages makes it possible to establish the following types of ore deposits and mineralogical associations for the platinum group of metals.

I. Placers.—The platinum has been mostly derived from peridotites, but also in less degree from pyroxenites, gabbros, metamorphosed gabbros (now dioritic rocks), and syenites, often gneissoid.

Geologists have long appreciated the importance of the peridotites, but have not generally realized that, in a minor degree, the syenites are also of wide distribution and that they likewise deserve emphasis. Thus, for example, they are recorded in the Urals, in Colombia, Brazil, and British Columbia.

II. Veins.—Platinum or palladium has been observed in veins in connection with gold at Tilkerode in the Hartz; in Minas Geraes in Brazil; at Santa Rosa in Colombia; and at Beresovsk, Russia. Whether the platinum or palladium is or is not associated in these localities with other metallic sulphides, such as are mentioned below, does not appear from the incomplete records.

The peculiar deposit at Broken Hill, New South Wales, may be mentioned in this connection, although it differs from the type.

---

[a] A. Montgomery, The Useful Minerals of Tasmania. (The statements are taken from a reprint kindly sent the writer by the author; but although evidently from some scientific society, it bears neither date nor reference.)

Platinum as a subordinate component in complex antimonial sulphides of copper and other metals (i e., tetrathedrite and bournonite) occurs in veins at Guadalcanal, Spain, and probably also in veins in the Val du Drac and elsewhere in eastern France. While this association is as yet only of mineralogical interest, it nevertheless shows that platinum *can* occur in this way, and makes it desirable that similar ores be tested where found.

Sperrylite occurs with covellite at the Rambler mine, Wyoming.

III. Platinum disseminated in eruptive rocks.—The platinum occurs in two forms. The first is the arsenide, sperrylite, which is associated with copper-nickel ores in uralitized norites, at Sudbury, Canada. The mother rock of the North Carolina sperrylite has not yet been fully described and interpreted. Platinum in polydymite may be mentioned as a corollary to the Sudbury occurrence.

In the second form the platinum in the native state is contained in basic eruptives, more especially peridotites. The platinum is frequently involved in a very intimate way with chromite. In the most natural interpretation of the phenomena the two minerals are regarded as having crystallized in the normal passage of the fused magma to the solidified condition. It should be clearly stated, however, that two views have long prevailed regarding chromite. Its deposits which are large enough to mine are so uniformly in serpentine, and are so often of such great extent, that the chromite has been believed by some to be a product of metamorphism. Its masses are supposed to be segregations which have resulted from the change of anhydrous chromium-bearing silicates to the hydrated form, with attendant separation of chromic oxide.[a]

On the other hand, chromite has been looked upon as a true igneous mineral; it has been discovered in basic eruptives, not in the least changed to serpentine; and it has therefore been believed to be, even when in serpentine, an unaltered survivor from a previous anhydrous magnesian eruptive.

In the one or two cases in which platinum has been discovered in quantity in the country rock (on Mount Soloviev, Nijni-Tagilsk district) it has certainly been associated with an altered and serpentinized or even carbonated form of peridotite. It is fair to raise the question whether the presence of the platinum is in any way connected with this excessive alteration, or whether the change happened to take place where the platinum was previously abundant. In the Tulameen district A. W. Johnston and the writer have found platinum in serpentinized belts along dislocations, but many belts have also been tested which gave no platinum. In these occurrences the platinum is so excessively fine that evidence is not easily attainable as to its relations to the mother rock. In the present state of our knowledge it might be possible to develop an argument not easy to refute, that the platinum in these surroundings had entered in solution or had been deposited in connection with the secondary changes, and yet from a study of many nuggets and from very careful and detailed observation of the peridotite on the Tulameen, it is the writer's belief that the platinum is, in far the greater part, a true igneous mineral. This belief rests upon the following grounds:

---

[a] A brief review and discussion of this difference of opinion, together with citation of authorities, will be found in the writer's Ore Deposits of the United States and Canada, 1900, p. 413.

1. Some nuggets contain the platinum associated with perfectly fresh olivine, and the relations are precisely those of two minerals which have crystallized from fusion and of which the platinum is the older. Had there been any secondary introduction of platinum, so sensitive a mineral as olivine would have shown some signs of change.

2. The platinum and chromite can be satisfactorily explained, as regards their relations, on the basis that the chromite is a slightly older mineral, which has become involved in and with the platinum, and that the latter has crystallized a little later. That the period of the much more abundant chromite has lasted into that of the rarer platinum, or even longer than it, is quite possible, because of the influence of the principle of solution. Chromite is somewhat more infusible than native platinum,[a] as has been shown experimentally by the writer's friend, A. W. Johnston. Nuggets of associated chromite and platinum have been placed before the oxyhydrogen blowpipe, and the platinum has been fused to globules and beads upon the still unaffected chromite, which, however, finally slagged over. No mineral in a fused magma can crystallize out at a temperature above its fusing point, although its elements or ions may be held in the molten mass, because of phenomena of solution, at a temperature considerably below its fusing point under the conditions of pressure prevailing at the time. It is therefore quite reasonable that chromite should have first begun to crystallize, and that around centers thus set up platinum should have later separated out, and should even have entirely inclosed chromite or have been itself inclosed by the continued growth of the chromite. In this way the structures shown in the drawings of nuggets given on a previous page can be satisfactorily explained. That, however, the platinum and chromite which, perhaps in a very finely divided state, have thus once formed may have later passed into solution and have become segregated and concentrated is not to be denied, but, so far as the writer can learn, our knowledge of the chemical relations of the two elements is so limited that the nature of such solution and precipitation can not be outlined.

Iridosmine is invariably involved in a mechanical way with the platinum, and it also occurs as a separate mineral. Iridosmine is excessively infusible, and because of this character it probably crystallized before the platinum and then became mechanically involved in the latter. When now found free it probably formed amid surroundings where little or no platinum was present.

---

[a] It must be remembered that the so-called native platinum is not the pure metal, but an alloy of predominant platinum with other metals of the group and with never-failing and important iron, minor copper, and frequent gold, all of which affect the fusibility.

When platinum is observed associated with olivine and free from chromite, it is probable that in this portion of the magma there chanced to be little or no chromic oxide, just as, vice versa, we repeatedly find chromite and no platinum.

J. H. L. Vogt, in one of his valuable and suggestive papers, has outlined a course for the crystallization and separation of the platinum somewhat different from the one here given.[a] Vogt had his attention specially focussed on the iron in the platinum and iridosmine, and endeavored to place the latter two in line with the terrestrial and meteoric irons of various kinds. In the present discussion attention is fixed upon the phenomena of the chromite, platinum, and iridosmine as presented in their actual occurrences. Vogt, consequently, considers the iridosmine as the culminating stage in the separation of the platinum group, whereas the writer regards it as the first development and the forerunner.

Stanislas Meunier has taken a quite different view regarding the origin of the platinum as well as of terrestial irons, of magnetite, chromite, and even of other metallic minerals. A. Inostranzeff has remarked the irregular shape of some of the Russian platinum and its lack of crystal form as observed in the mother rock. Professor Meunier lays great emphasis upon this character, and draws analogies between it and the relations of certain magnetites, chromites, and terrestial and meteoric irons to their associated silicates. The metallic minerals are described as ramifying throughout the other silicates and as even penetrating their cleavage cracks in such a way as to support the inference that they are of later origin than the silicates. Professor Meunier then states that by introducing volatilized chlorides of iron, nickel, platinum, etc., together with hydrogen, into a porcelain tube heated to redness and containing fragments of pyroxene, olivine, or rock, he is able to deposit the metals or alloys of several metals in the interstices in such a way as to imitate closely the natural occurrences. By varying the gases he can make magnetite, chromite, and even silicates. He therefore concludes that the native platinum has been brought in, presumably in a similar manner, and has been deposited so as to yield the nuggets.[b]

While it is of great interest to know that the single metals, their alloys, and even the silicates can be deposited in this way, yet crystallization from fusion appeals to the writer as equally competent to bring about the observed results and as having much greater claims to probability and therefore to general confidence.

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[a] Compare Zeitschr. für prak. Geologie, July, 1893, pp. 267-268.

[b] A summary of much previous work by Professor Meunier is given in the Comptes rendus a VII Session, Congrès Géologique International, p. 155.

One or two final conclusions of practical value may be drawn in closing this paper.

1. Experience thus far gained leads to the conclusion that platinum is very sparsely distributed in its mother rock and that the chances of finding it in quantities sufficient to mine are small. There is, nevertheless, a chance. If found, the recovery of the platinum by any means other than stamping and washing remains to be solved, and as the metal may be in a very finely desseminated state, this problem is a serious feature of the situation.

2. Large and permanent placers are to be looked for only in very old land areas which have been subjected to protracted degradation and concentration.

3. In the assay of antimonial, arsenical, and other copper ores, but especially of tetrahedrite (gray copper or fahlerz), it is worth while to look for small percentages of platinum.

4. Deposits of chromite deserve similar testing.

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UNITED STATES GEOLOGICAL SURVEY

CHARLES D. WALCOTT, DIRECTOR

THE

NORTHWEST BOUNDARY OF TEXAS

BY

MARCUS BAKER

WASHINGTON
GOVERNMENT PRINTING OFFICE
1902

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LETTER OF TRANSMITTAL

DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
Washington, D. C., January 16, 1902.

SIR: I have the honor to transmit herewith the manuscript of an account of the northwest boundary of Texas, and to suggest its publication as a bulletin of the United States Geological Survey.

Very respectfully,

MARCUS BAKER,
Cartographer.

Hon. CHARLES D. WALCOTT,
Director of United States Geological Survey.

THE NORTHWEST BOUNDARY OF TEXAS.

By Marcus Baker.

INTRODUCTION.

particular part of the Texas boundary here considered begins **eastern** bank of the Rio Grande near El Paso and runs easterly **thirty-second** parallel to the one hundred and third meridian; **north** on that meridian to its intersection with the parallel of ′, **the** northwest corner of Texas; thence eastward on the parallel **30′** to the one hundredth meridian, and thence southward on that **lian** to Red River. It is **in** the accompanying **(fig.** 1). This boundary, **t the** part on the one **redth** meridian, was cre- **by** Congress in an act **ved** September 9, 1850. **me** recent Government this boundary is not as here described. It **wn** as coincident with **arallels,** but instead of **iding** with the meridians **placed** 1 or 2 miles west **em.** This discrepancy d to an inquiry as to the cause and an investigation of the law **he** various surveys based thereon.

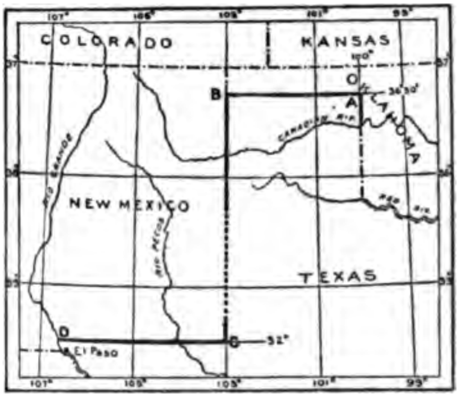

Fig. 1.—Diagram of Clark's survey (1859-60).

1835 Texas declared its independence of Mexico, and on Decem-), 1845, was admitted to the Union. It then comprised parts of **ory** now included in New Mexico, Oklahoma, Kansas, Colorado, Vyoming. In 1850 it sold to the United States for $10,000,000 territory north of latitude 36° 30′ and west of the one hundred hird meridian as far south as latitude 32°. The purchase was aplished by an act of Congress approved September 9, 1850.[a] that act most of the line here considered was first defined. The age of the statute is as follows:

> State of Texas will agree that her **boundary** on the north shall commence point at which the meridian of one hundred degrees west from Greenwich rsected by the parallel of thirty-six degrees thirty minutes north latitude,

---

[a] Statutes at Large, Vol. IX, p. 446.

and shall run from said point due west to the meridian of one hundred and three degrees west from Greenwich; thence her boundary shall run due south to the thirty-second degree of north latitude; thence on the said parallel of thirty-two degrees of north latitude to the Rio Bravo del Norte, and thence with the channel of said river to the Gulf of Mexico.

About eight years later provision was made for running and marking this boundary. Congress passed an act which was approved June 5, 1858, entitled—

> An act to authorize the President of the United States, in conjunction with the State of Texas, to run and mark the boundary lines between the territories of the United States and the State of Texas.[a]

This short act in three sections provided for the appointment of a "suitable person or persons" on the part of the United States to act with similar persons on the part of Texas in running and marking the line, and it appropriated $80,000 therefor. The boundary which they were to run and mark is thus described in the act:

> Beginning at the point where the one hundredth degree of longitude west from Greenwich crosses Red River, and running thence north to the point where said one hundredth degree of longitude intersects the parallel of thirty-six degrees thirty minutes north latitude, and thence west with the said parallel of thirty-six degrees and thirty minutes north latitude to the point where it intersects the one hundred and third degree of longitude west from Greenwich, and thence south with the said one hundred and third degree of longitude to the thirty-second parallel of north latitude, and thence west with the said thirty-second degree of north latitude to the Rio Grande.

The survey thus provided for was executed just prior to the civil war, in the years 1859 and 1860. Most of the boundary on the one hundredth meridian was surveyed and marked by the Indian contract surveyors Jones and Brown in 1859, and the remainder (except 130 miles on the one hundred and third meridian which have never been surveyed) was surveyed and marked by United States Commissioner John H. Clark in 1859–60.

An account of those surveys, and also of several others earlier and later which bear more or less directly on the present status of the boundary here considered, will be presented, the evidence afforded by these accounts will be discussed, and the conclusions reached will then be given.

HISTORY OF SURVEYS.

JONES AND BROWN'S SURVEY, 1859.

The one hundredth meridian, forming the eastern boundary of the panhandle of Texas, was surveyed and marked, under the direction of the Indian Office, by A. H. Jones and H. M. C. Brown, contract surveyors, in 1859. The manuscript record of the survey, with the correspondence, etc., is now on file in the Indian Office. The initial monument is on the north bank of the main Red River and 30 chains therefrom. It is said to be a pile of gypsum rock, and Prof. H. S. Pritchett, now president of the Massachusetts Institute of Technology, who in June, 1892, visited it and determined its latitude and longitude, thus describes it:

---

[a] Statutes at Large, Vol. XI, p. 310.

> A pile of stones on a very prominent hill, the stones being piled up to a height, perhaps, of 2 feet in a circular form, 6 feet across, approximately, in the center of this heap being a stone some 2½ feet high, on which are cut the letters "100 W."[a]

This initial monument was established by Daniel G. Major, astronomer, early in 1859, its longitude having been determined by moon culminations. Major was appointed astronomer for the Indian boundary surveys on November 3, 1857. On April 2, 1859, he forwarded to the Indian Office the records of astronomical observations made by him for locating the one hundredth meridian at its intersection with Red River. There are five books of observations and computations, three small and two large ones, all now in the Indian Office, but these do not contain any summary of results, and I have found none anywhere. The only record found is that Jones and Brown started from the monument (above mentioned) "as established by the astronomer." From this point they surveyed northward 109 miles 56 chains 54 links, setting monuments at every mile. Their "terminating monument" is 19 miles north of the Canadian River.

The observations of moon culminations were made with a transit in an observatory at Camp Radziminski, on Otter Creek, near the one hundredth meridian, by Mr. Major, in January, February, and March, 1859.

As to what was known of the location of this meridian prior to Major's observations, we learn the following from a letter written by Surveyors Jones and Brown to the Commissioner of Indian Affairs on November 30, 1858, and now in the files of the Indian Office:

> CAMP RADZIMINSKI,
> *Near the 100th meridian, west longitude, November 30, 1858.*
>
> SIR: * * * We are now encamped within sight of Major Van Dorn's command on Otter Creek, west of the Wichita Mountains, and about 2 miles east of the point on this creek that Captain Marcy reports to be the one hundredth meridian, west longitude, which he describes in the first page of his introductory remarks as having been ascertained by a pocket chronometer, and does not vouch for the correctness of the result. Since our arrival here the results of our observations are of such a character as to safely notify the Department that the one hundredth meridian, west longitude, is at least 40 miles farther westward than any line hitherto reported or delineated upon the topographical maps.
>
> We have a good observatory, and our instruments are all in excellent order. We are likely to winter at this post, and it will take fully three months' constant observations before the accurate initial point of the one hundredth meridian can

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[a] Record in the Greer County case, United States *v.* Texas, pp. 1199–1202. There is a copy of the Record in the library of the Bureau of American Ethnology, in the United States Supreme Court, and in the library of the Department of Justice.

be identified. It is an important boundary and requires great care. The delay incident upon ascertaining a true longitude originates from lunar observations, and it requires at least two full moons, and probably three, before the result can be known with sufficient accuracy.

A. H. Jones,
H. M. C. Brown,
United States Surveyors, Indian Boundary Lines.

Hon. Charles E. Mix,
Commissioner Indian Affairs.

In connection with the famous Greer County case, United States *v.* Texas, Prof. H. S. Pritchett, now president of the Massachusetts Institute of Technology, was employed by Texas to determine as accurately as possible the longitude of this initial monument. His results, printed in the record of that case, are here reprinted (pp. 31–35).

CLARK'S SURVEY, 1859-60.

The original survey of the northwest boundary of Texas was made by the United States and Texas Boundary Commission. The United States commissioner and surveyor was John H. Clark, and as he did all the surveying I have called this the Clark survey. An account or report of the Clark survey, presented to Congress in response to a call therefor, was printed in 1882 as Senate Ex. Doc. No. 70, Forty-seventh Congress, first session, which may, for brevity, be cited as the Clark report. The story of the Clark survey is in brief as follows:

It was executed in 1859–60. All the surveying work was done by Clark, the Texan commissioner withdrawing from the work in May, 1859. The line was surveyed and marked by mounds from the vicinity of El Paso eastward on the thirty-second parallel to the one hundred and third meridian, and north on the one hundred and third meridian for about 20 miles, between January and May, 1859. The longitude of the monument at the intersection of the thirty-second parallel and the one hundred and third meridian rests upon the station Frontera of the Mexican boundary survey, carried eastward from the Rio Grande 211 miles by chaining and triangulation.

The northwest corner of Texas was established in September, 1859; in latitude, by zenith telescope observations, and in longitude by transfer from Johnston's survey (not Johnson's monument) of the southern boundary of Kansas. This same J. H. Clark was the astronomer in Johnston's party in 1857, and determined by moon culminations the longitude of the so-called Johnston's monument to be 103° 2′ 22.7″ west from Greenwich. In September, 1859, Clark surveyed and monumented the one hundred and third meridian from the northwest corner of Texas southward for 156 miles, leaving a gap of 130 miles between this part, run from the north in September and that run from the south in the preceding May. The following year, 1860, he returned to the work and began on the one hundredth meridian where it crosses the Canadian River. He joined and accepted the previous survey by Jones and Brown, contract surveyors, who had, in 1859, surveyed the one hundredth meridian from the main Red River northward to a point 19 miles north of the Canadian, prolonged that line northward to its intersection with the parallel of 36° 30′, the northeast corner of the Texas panhandle, and then surveyed and marked the northern boundary of the panhandle. This done, he returned to Washington and worked, during 1861, on his maps, observations, and computations. This was the opening year of the civil war. There was great impatience at what was deemed slowness in finishing up, and finally the work was abruptly ended in an unfinished condition in January, 1862. The maps were unfinished and the reductions incomplete. They remained in this condition till 1882, when the Senate, by resolution, called for the report. The result is Senate Ex. Doc. No. 70, Forty-seventh Congress, first session, from which most of the information here recorded has been gleaned. From that report it may be learned that, in January, 1882, "No part of said boundary has ever been officially agreed upon or accepted by the two governments as contemplated in the act of Congress authorizing the survey."

Since that date, however, part of the Clark survey has been adopted by the United States. In the sundry civil act approved March 3, 1891, it is enacted that "the boundary line between said public-land strip and Texas, and between Texas and New Mexico, established under the act of June fifth, eighteen hundred and fifty-eight, is hereby confirmed." By this act Clark's survey is confirmed as to the one hundred and third meridian. It is not confirmed as to the one hundredth meridian, except for the monument at the northeast corner of the panhandle. This story will now be told in somewhat greater detail.

Shortly after the passage of the act of June 5, 1858, providing for this survey, the matter was placed, on the part of the United States, in charge of the Secretary of the Interior, Hon. Jacob Thompson. He at once corresponded with the governor of Texas with a view to agreeing upon a plan of operations, and proposed that the survey should begin near El Paso, taking some point on the Mexican boundary as a starting point; should then proceed eastward on the thirty-second parallel to longitude 103°; and thence northward on the one hundred and third meridian. The governor of Texas objected to this plan on the ground that the delimitation of the boundary north of Red River was of more immediate and pressing importance.

Early in July, 1858, Mr. John H. Clark was appointed commissioner, astronomer, and surveyor on the part of the United States, and Mr. William R. Scurry was appointed commissioner on the part of Texas. On July 9 Clark received his instructions from Hon. Jacob Thompson, then Secretary of the Interior, and left Washington for Texas, arriving in Austin late in August or early in September. Here he met the governor, Hon. H. R. Runnels, and accompanied him to San Antonio.

Apparently a conference was had in San Antonio early in September between Governor Runnels and the two commissioners, Clark and Scurry. As to the outcome, Clark reported to Secretary Thompson from San Antonio, under date of September 8, "They have concluded to adopt our plan of operations throughout."[a]

On November 12, 1858, everything was in readiness, and the two commissioners, with their outfit, left San Antonio for "the initial point,"[b] where they arrived on January 2, 1859, and began the survey on the following day. "The plan of survey adopted was to determine the line in latitude with a zenith telescope as often as it might be necessary to secure accuracy, and in longitude by triangulation and direct measurement from the initial point, the longitude of this point being found by transfer from Frontera, a well-established station of the Mexican boundary survey."[c]

As to the division of the work between the commissioners Mr. Clark writes: "The performance of the astronomical work, upon which the boundary line is based, I undertook exclusively, the Texan commissioner taking a part in the tracing and demarcation of the line by furnishing half of the surveying force."[d]

Most of the month of January, 1859, was spent in connecting the initial point with the astronomical station Frontera, of the Mexican boundary survey. A base line 4,750 feet long was cleared and "carefully and repeatedly measured with standard rods taken out for the purpose." Frontera was then connected with the initial point by a triangulation resting on this base. This work completed, the party on January 26 started eastward along the thirty-second parallel. The sandy and desert character of the country made progress slow and difficult, and much labor and travel were necessary to keep the party supplied with water. From the initial monument on the Rio Grande eastward to the one hundred and third meridian is, according to Clark, 211[e] miles, and to survey this line he was compelled to travel 1,248 miles. The party, which had started eastward from the Rio Grande late in January (1859), reached the one hundred and third meridian in May, and on the 22d of that month erected the boundary monument at the intersection of the thirty-second parallel and the one hundred and third meridian. "This is a mound of very sandy soil; it has a bottle buried in it which contains the latitude and longitude of the point, a list of the names of the members of the Commission, and the date of its erection."[f] An astronomical station was established near this corner, and observations were made on 27 pairs of stars on the nights of May 17, 18, 20, and 21, the resulting latitude being 31° 58′ 42.4″, or about 1⅓ miles south of the parallel. It does not appear that any observations were made for longitude, but that the determination of the position of the one hundred and third meridian at this point rests upon Frontera, and rough measurements made over a distance of about 225 miles, measurements made in small part by triangulation and in large part by chaining. On the thirty-second parallel 32 monuments were erected, for the most part mounds of earth or stone.

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[a] Senate Ex. Doc. No. 70, 47th Cong., 1st sess., p. 269.

[b] Same, p. 296.

[c] This initial point is at the intersection of the thirty-second parallel and the Rio Grande, about 18 miles northwest of El Paso.

[d] Senate Ex. Doc. 70, 47th Cong., 1st sess., p. 296.

[e] Same, p. 298. On p. 56 of same report this distance is given as 211.4246, which I take to mean 211 miles and 4,246 feet.

[f] Senate Ex. Doc. 70, 47th Cong., 1st sess., p. 302.

On completing the thirty-second parallel the party started northward along the one hundred and third meridian with a pack-mule train, the heavy sand preventing the use of wagons. Starting in the middle of the afternoon of May 24, the party traveled 14½ miles (according to the field notes) and camped. At this camp time and latitude observations were made with a sextant, the resulting latitude being 32° 7′ 52″, and the monument was erected on the meridian. The next day the party continued northward, traveling (according to field notes) 20½ miles. They then camped again, and with sextant determined time and latitude. The latitude was found to be 32° 20′ 45″, indicating the northing made as about 14 miles. Here they erected a monument. The country traversed to this point was level, sandy, and desert; not a drop of water was to be had except that carried with them. Country of the same character was seen to the northward, and accordingly the further continuance of the line was abandoned and the party turned westward and proceeded toward the Pecos River, which they reached on the afternoon of May 29.

Mr. Clark, writing in September, 1861, says that on or about February 18, 1859, when the party was preparing to leave El Paso for the line, Mr. Scurry, the Texan commissioner, notified him that he had resigned. Nevertheless, it appears that Mr. Scurry continued with the party some time longer, for early in May John E. Weyss, topographer in Clark's party, and Anson Mills, Mr. Scurry's principal assistant, quarreled, whereupon Mr. Scurry wrote Clark a letter declaring that "the Texas commission will not proceed with the survey from this point."

From the best information Clark then had as to the course of the upper Pecos, he thought it not far from the one hundred and third meridian. His plan, therefore, was to run a meridian line near the Pecos, from which he could draw his water supply, and then measure offsets eastward to the one hundred and third meridian. Finding the distance much greater than he had expected, he abandoned this plan and started for the northwest corner of Texas, proceeding up the Pecos and surveying as he went.

Near the northwestern corner of Texas is Rabbit Ear Creek or North Fork of the Canadian River. Reporting to the Department on October 27, 1859, Clark writes: "I arrived at Rabbit Ear Creek from Fort Union the 3d of August, and proceeded at once to establish the northwest corner of the boundary, which was done by transfer from the Kansas line as to longitude, the result of independent observations being used for the latitude. A lunation was also observed, with the view of serving as a check on the accuracy of the transfer."[a] This transfer was made by means of triangulation over a distance of about 35 miles.[b] As to this transfer Clark also says, writing on September 30, 1861: "Again the surveying party was sent over to the Kansas boundary, and, taking up the one hundred and third meridian *as then established*, transferred it to its intersection with the parallel for the longitude."[c] At a camp on Rabbit Ear Creek, near the northwest corner of Texas, transits of stars and moon for determining the longitude were observed on the evenings of August 7, 9, 11, 12, 13, 14, and 15. Of these observations Clark made no use. Writing to the Secretary of the Interior July 24, 1861, he says: "As the results of the longitudinal determinations are not essential to the accuracy of the maps except as checks, I do not propose to prosecute this branch of the work further, and it may therefore be closed. They can be computed hereafter if desirable."[d] I have not discovered that any use was ever made of these observations. Observations for latitude with zenith telescope were made at Rabbit Ear Creek on August 4, 5, 21, and 22, the resulting latitude being 36° 34′ 16″.[e]

While at Rabbit Ear Creek "a second Texas commission" joined the party. Having determined the place and erected a monument at the intersection of the parallel of 36° 30′ with the meridian of 103°, the party, on August 23, started south along the one hundred and third meridian. The astronomical station on Rabbit Ear Creek was about 8 miles northwesterly from the northwest corner of Texas. More exactly, the Clark monument set to mark the intersection of the one hundred and third meridian by the parallel of 36° 30′ bears E. 37° 53′ S., distant 7 miles and 5,252 feet from the astronomical station on Rabbit Ear Creek.[f]

The survey and marking of the northern part of the boundary on the one hundred and third meridian from the parallel of 36° 30′ southward took about a month. It was begun by Clark on August 23 and finished on September 20, 1859.

The meridian was traced with a large theodolite, the distances measured and checked by latitude observations. Latitude observations with sextant were made at five stations, with the following results:

	Latitude.		
	°	′	″
September 14, 1859	35	09	07.8
September 15, 1859	35	00	03.0
September 17, 1859	34	46	59.0
September 19, 1859	34	27	27.8
September 20, 1859	34	21	40.5

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[a] Sen. Ex. Doc. No. 70, 47th Cong., 1st sess., p. 278.

[b] Same, p. 279.

[c] Same, p. 279. Italics not in original.

[d] Same, p. 283.

[e] Same, p. 208.

[f] Same, pp. 86–88.

The line was continued about 8 miles beyond this last station to some low sand hills, where the last monument was erected on September 21, in about latitude 34° 14′.

This closed the season's work of 1859. The party then proceeded to Fort Smith for winter quarters. The length of the one hundred and third meridian from latitude 32° to 36° 30′ is 310 miles. Of this line Clark surveyed and marked:

	Miles.
From the south end, setting 3 monuments	24
From the north end, setting 23 monuments	156
Total 26 monuments	180
Leaving an unsurveyed part between 32° 21′ and 34° 14′ of	130
Total	310

The number of monuments erected by Clark on this one hundred and third meridian is 26. They are chiefly earth or stone mounds, sometimes erected around a stake. They are described in detail in Clark's report, dated September 30, 1861.[a] The present condition of these monuments, erected more than forty years ago, is not known. I was told at the Land Office that, though they had been searched for by land surveyors, only three of them had ever been found. These three are on or near the banks of the Canadian River. (See Taylor and Fuss's survey, 1883, p. 29, and Preston's survey, 1900, p. 36.)

Having wintered at Fort Smith, Ark., Clark set out on April 28, 1860, to complete the boundary survey, going by way of Forts Cobb and Arbuckle to the one hundredth meridian at the point where it intersects the Canadian River. He arrived at this point June 8, 1860. The one hundredth meridian had been surveyed and marked from the Canadian River northward for 19 miles by Jones and Brown in 1859, under the direction of the Indian Office. Clark was instructed by the Secretary of the Interior, Hon. Jacob Thompson, to adopt this line[b] so far as it had been laid down and to prolong it northward to latitude 36° 30′. This he did between June 8 and 20. The adopted longitude was checked by prolonging the line northward about 35 miles to the Kansas boundary, in latitude 37°. The result is thus stated by Clark:

> The one hundredth meridian, determined and run as the eastern boundary of Texas, falls within 1,700 feet of the one fixed by me on the Kansas boundary in 1857.

Elsewhere we learn[c] that the one hundredth meridian, as fixed on the southern Kansas boundary, is to the west (1,700 feet) of the one hundredth meridian adopted for the eastern boundary of Texas. The northeast corner of Texas was fixed as to its longitude by Clark's extension northward of the one hundredth meridian, as determined by Jones and Brown and checked by Clark, by connecting with his own determination of the one hundredth meridian on the south boundary of Kansas. It was fixed in latitude by observations with zenith telescope on June 15, 17, and 19, 1860, the astronomical station being in latitude 36° 32′ 49.2″, i. e., a little more than 2½ miles north of the parallel. It was about the same distance east of the one hundredth meridian.

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[a] Sen. Ex. Doc. No. 70, 47th Cong., 1st sess., pp. 302-303.

[b] Same, p. 300.

[c] Same, pp. 123, 290-291.

After establishing the northeast corner Clark ran west on the parallel of 36° 30′, surveying and erecting monuments. This was done under great difficulty from lack of water. Finally the party abandoned the line to seek water on the North Fork of the Canadian. Clark then went to the west end, the northwest corner of Texas, and traced the parallel eastward to the point where he had abandoned it, thus completing the field work of the boundary survey, except 130 miles on the one hundred and third meridian previously mentioned. This completed, he set out July 12 for the one hundredth meridian, where he traced a part of the Jones and Brown line along the one hundredth meridian southward from Commission Creek. On this part mounds had been erected at every mile. He says that he found that some of these falling in hollows had been washed away,[a] while others had been destroyed by buffaloes. He then returned to Washington, and was engaged in office work till his work was terminated by the Interior Department on January 16, 1862.

The published correspondence indicates friction between Clark and the Commissioner of the General Land Office, under whom the work had been placed. The office work was left incomplete and the maps were unfinished, some of them being unlettered.

On January 6, 1882, the Senate, by resolution, called upon the Secretary of the Interior for the report "of the survey of the United States and Texas Boundary Commission, made under the provision of the act of Congress approved June 5, 1858." The reply to that call is Senate Ex. Doc. No. 70, Forty-seventh Congress, first session, an octavo volume of 309 pages, containing 15 maps. Most of the statements here made are taken from or based upon that report, supplemented by conferences with various employees in the General Land Office.

The maps in that report are 15 in number, of which 14 show the line in detail, with adjacent topography, trails, stations, monuments, etc., from El Paso eastward along the thirty-second parallel, northward along the one hundred and third meridian, and so on. I have sought in the General Land Office for the originals of these maps, yet unsuccessfully with a single exception. That exception relates to No. 3 (erroneously No. 4 in the printed report). The manuscript which may have been the original of map 3 of the printed report is drawn all in black, shows topography, monuments, trails, etc., is backed on cloth, bound in blue braid, is 24.5 by 47 inches in size, and is entitled:

> Texas Boundary Line surveyed under the direction of the Department of *the Interior* Scale: 100000 No. 3.

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[a] Sen. Ex. Doc. No. 70, 47th Cong., 1st sess., p. [illegible]

It bears on its back the erroneous indorsement, "Map showing boundary between U. S. and Mexico," instead of the correct indorsement, "Map showing part of the boundary between the U. S. and Texas."

In the printed Clark report are 15 maps, of which 1–14 are photolithographs, showing the line in sections. The scale is about 1:160 000. From the one supposed original I infer that these 14 sectional maps were all drawn on a scale of 1:100 000.

A general map of the whole line, No. 16, was also prepared, but was not printed with the others. Now, these two maps, 3 and 16, have a curious history. The Commissioner of the General Land Office, N. C. McFarland, wrote on January 11, 1882:

> Of the 16 maps returned by the commissioner (J. H. Clark) Nos. 3 and 16 are missing, the latter being a general map of the whole survey, noted on the records as "missing" as early as May 7, 1862; the former, No. 3, being a map of that part of the thirty-second parallel from Crow Spring to the Pecos River.[a]

Now, the curious part of this history is that these two missing maps are both on file in the General Land Office, and so far as my search has gone all the others are missing.

The original manuscript of the general map, No. 16, made by John E. Weyss, is beautifully drawn, and is slightly damaged by water in the upper left-hand corner, presumably as a result of the Patent Office fire in 1877. It shows the country between the parallels 31½° and 37½° and the longitude between the meridians 96½° and 107°. The map is 26.5 by 40 inches, is drawn wholly in black, and contains a list of positions. It is entitled:

> Map of the | United States | and | Texas boundary line | and | adjacent territory | determined & surveyed | in 1857–8–9–60 | by | J. H. Clark, U. S. Commissioner, &ca. &ca. | under the direction of the | Department of the Interior | Astronomical determinations by J. H. Clark and H. Campbell | Triangulation & topography by J. E. Weyss, assisted by W. P. Clark | Drawn by J. E. Weyss | Scale | 1 Million, or 15 Miles 4133 ft. to 1 inch.

It bears two indorsements, viz:

First:

> Original map of U. S. & Texas Boundary. Rec'd back from Office of U. S. Engineers, Nov. 14, 1885.

Second:

> B^y 35. United States and Texas Boundary Line &c., &c., 1860. J. H. Clark & others.
>
> 1 original
> 1 tracing
> 2 photoliths made Nov. 5, 1885.
> —
> 4

There is now no tracing with it and only 1 photolithograph. A few copies of this photolithograph still exist at the office of the Chief of Engineers.

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[a] Sen. Ex. Doc. No. 70, 47th Cong., 1st sess., p. 2.

JOHNSTON'S SURVEY, 1857.

The southern boundary of Kansas was first surveyed by a party under the command of Lieut. Col. Joseph E. Johnston, U. S. Army, in 1857. The astronomer of the party was John H. Clark; the assistant astronomer, Hugh Campbell, and the topographer, John E. Weyss.

The party took as the initial point of survey the intersection of the thirty-seventh parallel with the western boundary of Missouri. The longitude of this western boundary was taken from "the map" to be 94° 38′ 03.6″ west of Greenwich. From this meridian to the one hundred and third meridian is 8° 21′ 56.4″, equal in latitude 37° to 462.71 statute miles. Having made this calculation, the party measured west on this parallel 462.71 miles and set a monument, called the terminal monument, on the spot which the chaining indicated to be the one-hundred and third meridian. This monument is known in the late records as the Johnston (erroneously Johnson) monument. As a check, however, on this long chaining across the plains, an astronomical station was established in its vicinity, and the longitude was determined by moon culminations. This astronomical station appears to have been 5,760 feet (1′ 11″) east of the terminal station and about a mile south of the thirty-seventh parallel. The lunar observations were made with transit on August 29, 31, September 1, 6, 7, 8, 9, 1857. On completing them Clark and Campbell were sent back to the initial point on the Missouri line to make similar observations, which they did on October 27, 28, 31, November 2, 3, 4, 5, 1857. To compute the best results for the longitude of the terminal station, corresponding observations were obtained from Greenwich. The resulting longitude of the Johnston monument was 103° 2′ 22.7″ west of Greenwich, i. e., 2′ 22.7″ west of the one hundred and third meridian. In latitude 37° this distance, 2′ 22.7″, is equal to 11,575 feet, or, according to Clark's calculation, 11,582 feet. Accordingly, they adopted as the intersection of the thirty-seventh parallel and one hundred and third meridian a point 11,582 feet east of the Johnston monument.

The records of this survey are in the office of the Chief of Engineers in the War Department. The observations, computations, maps, and Campbell's Journal are there. Nine maps, numbered I to IX, from the initial monument westward, drawn by John E. Weyss, show the line, adjacent topography, camps, stations, etc. All are on a scale of 1:100000 except the last one, No. IX, which shows on the larger scale of 1:25000, the region about the terminal monument. Of the nine maps in the series the General Land Office has copies of numbers I to VII only.

Map No. IX is entitled as follows:

> Map No. IX. Southern boundary of Kansas, showing the country in the vicinity of the terminal point, on an enlarged scale: also the difference between the *survey and* astronomical observations. Determined and surveyed under the direc*tion of Lt.* Col. J. E. Johnston, 1st Cavalry, U. S. A., by J. H. Clark, astronomer, *assisted by* Hugh Campbell and J. E. Weyss, C. E. Scale, 1:25,000.

Upon this map is neatly lettered in the draughtsman's hand the following note:

> NOTE.—The reason of the difference between the survey and astronomical determination of the terminal point is as follows: The west point of Missouri, or initial point of survey, according to the map, was taken to be 94° 38′ 03.6″ west of Greenwich. From this point 462.7 miles were run west, which places the one hundred and third meridian where this terminal point was erected, as shown on the map. After a careful comparison, however, made at Washington, of moon culminations observed near this point, with corresponding observations at Greenwich, the one hundred and third or true meridian was found to be 11,582 feet to the east of the terminal point of survey, and consequently gives the west boundary of Missouri 94° 40′ 26″.
>
> Washington, September, 1858.
>
> J. E. WEYSS, *Surveyor.*

The final results for longitude of the astronomical station near the terminal monument are summed up in the manuscript book of computations in the office of the Chief of Engineers, as follows:

Computation for longitude, southern boundary of Kansas.

[Results deduced final.]

	h. m.	s.
August 31, 1857	6 51	54.470
September 1, 1857		59.720
September 6, 1857		76.270
September 7, 1857		66.770
September 8, 1857		64.826
September 9, 1857		60.761
August 29, 1857		70.646
Mean	6 52	04.781=103 01′ 11.70″

It will be remembered that the adopted longitude of the initial monument was 94° 40′ 26.3″, and that this also was checked by similar lunar observations by Clark and Campbell the same season. The discrepancy between this assumed value and that resulting from Clark's observations of moon culminations is very marked. In the same book of computations already cited we find the following:

Results for longitude at western boundary of Missouri.

	h. m.	s.
October 27, 1857	6 18	02.69
28, 1857		07.46
31, 1857		09.31
November 2, 1857		02.22
3, 1857		05.68
4, 1857		03.47
5, 1857		04.68
Mean	6 18	05.07

Results for longitude at western boundary of Missouri—Continued.

	h. m. s.	s.
Longitude of astronomical station	6 18 05.072	± 0.605
Missouri line 158.5 feet east of astronomical station = 1.95″ = $0^s.13$	00.13	
	6 18 04.942	
	° ′ ″	
In arc this equals	94 31 14.1	
Whereas the adopted value was	94 40 26.3	
Difference	9 12.2	

A good map, showing the results of this survey, was prepared by the topographer of the party, John E. Weyss, and published by Congress in 1858 in a document entitled:

House of Representatives, Ex. Doc. No. 103, Thirty-fifth Congress, first session. Southern Boundary Line of Kansas—Letter from the Secretary of War (John B. Floyd) transmitting the report of Colonel Johnston's survey of the Southern Boundary of Kansas. April 16, 1858. Ordered to be printed. 8°, 3 pages, 1 map.

The map, which is sometimes found separated from the report, is entitled:

Sketch of the Country | near the Southern Boundary | of | Kansas. | Astronomical and Barometric determinations by J. H.Clark & H. Campbell. | Survey by J. E. Weyss. | (Signed) J. E. Johnston. Lt. Col. 1st Cavalry. | Lith. of J. Bien, 60 Fulton street, N. Y. |
Scale, 1:1 000 000, or 15 miles 4,133 feet to the inch. Size, 22 by 48½ inches. Shows topography, trails, stations, etc., from west line of Missouri westward to longitude 106°.

MACOMB'S SURVEY, 1859.

Capt. J. N. Macomb, United States topographical engineer, in the summer of 1859 conducted an exploring expedition from Santa Fe, N. Mex., to the junction of the Grand and Green rivers. On completing this work he returned to Washington, stopping en route at the southwest corner of Kansas, and, as instructed, he erected a monument (since called the Macomb monument) east of the monument erected by Lieutenant Colonel Johnston in 1857 (since called the Johnston monument) to mark the southwest corner of Kansas.

As to this, Macomb says:[a]

> I was directed on my return * * * to stop at the southwest corner of the Territory of Kansas to set up a new monument at a point some 2½ miles to the east of the one originally placed there. I accordingly * * * went up the Cimarron to the point indicated, and retraced that part of the thirty-seventh parallel from the old monument to the meridian of 103°, as laid down upon the map accompanying my instructions, and at the intersection of these two geographical lines I erected a rough stone monument. The original monument above alluded to is of earth and sods. This duty was finished about the middle of November, 1859.

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[a] Report of Exploring Expedition in 1859 under Capt. J. N. Macomb, with geology by J. S. Newberry, 4°, Washington, 1876, pp. 7-8.

DARLING'S SURVEY, 1868.

On May 22, 1868, Mr. Ehud N. Darling entered into a contract with the United States to survey and mark the thirty-seventh parallel of north latitude so far as it constitutes the northern boundary of New Mexico, commencing at the one hundred and third and ending at the one hundred and ninth meridian of west longitude. This survey was begun at the Macomb monument July 19, 1868, and ended at the one hundred and ninth meridian on November 18, 1868.

As to his starting point, the Macomb monument, Darling says:

> The cobblestone monument established by Captain Macomb, United States Army, is 8 feet at base, conical shape, 5 feet high and 2½ feet top. In order to better perpetuate the initial point I set a stone 30×10×8 imbedded 20 inches in monument, with 10 inches projecting above same, engraved on the southeast Ind. T.: on the southwest N. M.: on the the northwest Col. T., and on the northeast 1868 and 103° W. L.

Measuring west Darling found, at the distance of 1 mile 68 chains 20 links, a monument which he identified as the Johnston monument of 1857. He says he found an "earthen mound situated on a high level plateau, established for the one hundred and third meridian of west longitude from Greenwich, on the thirty-seventh parallel of north latitude, in the survey of the southern boundary of Kansas in 1857. Mound was found partially destroyed and apparently had been 8 feet in diameter and 5 feet high. Found near mound a stone marked with a brush, in black—N M-COL-IND TER-37 N L—on the four sides, respectively."

This account is drawn up from the manuscript field notes of Darling and his map, both now on file in the General Land Office.

CHAFFEE AND MAJOR'S SURVEYS, 1869 AND 1872.

In 1869 Mr. O. N. Chaffee determined the longitude of the western boundary of Kansas. This he did by chaining from Julesburg 16 miles 10 chains 47 links east. The longitude of Julesburg had been telegraphically determined by the Coast Survey. The longitude resulting from Chaffee's measures is 24° 59′ 49.35″ west of Washington (old Naval Observatory dome).

In 1872 Mr. J. J. Major again determined the longitude of this line. He first determined telegraphically the longitude of Fort Wallace by exchange of signals with Fort Leavenworth on the nights of October 1, 2, 3, 7, 8, 9, 1872, and thence by chaining from Fort Wallace about 25 miles westward (in latitude 38° 58′). The resulting longitude was 25° 00′ 07.35″ west of Washington (old Naval Observatory dome).

The mean of these two values is 24° 59′ 58.3″ west of Washington, or 102° 03′ 04″ west of Greenwich.

The law names the twenty-fifth meridian west from Washington as the western boundary of Kansas.

Major surveyed the Kansas-Colorado boundary line in 1872. Beginning at the north end he chained southward 207 miles 26 chains to its south end, or the thirty-seventh parallel, where he set a terminal monument to mark the corner of Kansas-Colorado-Indian Territory. Of this terminal monument he says:

> Made excavation and deposited can, bottle, bones, and stakes, and broken flag-poles. Planted a white pine, seasoned, sawed pine post 8 feet long, 8 inches square, deeply and legibly marked on the north 25 L; on the south 207 M., 26 Chs on the east K; on the west C. Built mound with four pits to cardinal points.

This account is drawn up from manuscript records now on file in the General Land Office.

MAJOR'S SURVEY, 1874.

In 1874 Mr. John J. Major, United States astronomer and surveyor, surveyed and marked at every mile the thirty-seventh parallel from the Kansas-Colorado-Indian Territory monument, set by himself in 1872, westward to the Johnston monument, and thence southward in the meridian of that monument to the parallel of 36° 30′. The longitude of the Kansas-Colorado-Indian Territory corner, from which he started, is 102° 03′ 04″ west of Greenwich. (See Chaffee and Major's surveys, 1869 and 1872.) At a distance of 55 miles 22½ chains from his starting point he found the Macomb monument, of which the longitude resulting from this chaining would be:

	°	′	″
Longitude of starting point	102	03	04
55 miles 22½ chains = 55.281 miles (in latitude 37°)	0	59	58
Longitude of Macomb monument	103	03	02

At a distance of 57 miles 4½ chains from the starting point Major found the Johnston monument, the longitude of which resulting from this chaining would be:

	°	′	″
Longitude of starting point	102	03	04
57 miles 4½ chains = 57.056 miles (in latitude 37°)	1	01	54
Longitude of Johnston monument	103	04	58

Its longitude resulting from moon culminations, observed by Clark in 1857, is 103° 02′ 22.7″.

Major identified the monuments of Macomb and Johnston. He makes no reference to any monument set by Johnston in 1857 except the terminal one, called the Johnston monument.

At 42 miles and 42 chains from the starting point and 10 chains south of the parallel, as he was running it, Major found a monument set by Darling in 1868 as the initial point of his survey. This is 12 miles 60 chains east of the Macomb monument. Major concluded that Darling at first mistook something for the Macomb monument, and after erecting this initial monument of his survey and measuring west about 13 miles found the true Macomb monument, recognized it as such, and there began anew, without returning to destroy the monuments already set. Major found several of these monuments erected by Darling; he also identified both the Macomb and Johnston monuments and describes them. From his starting point to the Macomb monument is, by his chaining, 55 miles 22½ chains; from the starting point to Johnston monument, 57 miles 4½ chains; distance from Macomb monument to Johnston monument, according to Major, 1 mile 62 chains.

Major describes the Macomb monument thus:

> A large stone monument 10 feet in diameter at base, 8 feet high, and capstone marked C., N. M., I. T., 1868. Removed the monument for further information, but found none. Mr. Darling had built over Macomb's original monument. Rebuilt the monument so that it stands as Darling left it.

As to the Johnston monument, 1 mile 62 chains west of this, he says:

> It is a large earth mound 12 feet at base and 3 feet high, sodded, with several stones about it. * * * Dimensions of capstone, 18 × 13 × 15, marked K, 103 L. N. M., with black paint, nearly obliterated; 18 more recently cut into the stone; situated on a high table-land; new subscription N. M., 103 L., on opposite sides, and 37 L., 1874, on opposite sides.

From this "Johnson monument" erroneously taken by Major to mark the one hundred and third meridian, he ran south, setting marked monuments at every mile. At 34 miles and 40 chains he set a monument to mark the "northwest corner of the State of Texas." As to this monument, called in the field notes "terminal monument," Major says, "Made excavation, deposited bones and glass, erected pine 7 feet × 7 inches, deeply marked TEXAS, N. M., 103 W. L."

As to Clark's previous determination of this same corner, Major says:

> Having reached the 36° 30′ parallel, according to the chain measurements, I commenced a close search for the monument erected in 1859 by the Texas boundary commissions. After a very thorough examination by all my party, together with portion of the escort, of a belt of country 2 miles wide and 2½ miles east and one-half mile west of line, I failed to find either the initial or other monuments of said line. The topography of the country is such as to designate very closely where this monument had been, but the evidence was wanting, except in finding a few scattered rocks, which were doubtless a portion of said monument, as they had been conveyed to this place from the Rabbit Ear Range, some 7 miles distant. I therefore reestablished this corner as described in field notes. We were enabled to trace the old trail from this vicinity to Colonel Johnson's or Clark's astronomical camp, some 6 miles northwest, on the creek, where there was a stone designating the grave of "Jane Quin, died 1859;" on the other side, "103 W. L., 36° 30′ L.," showing that this stone was probably intended to be used in marking the Texas corner.

This account is drawn up from the original manuscript records, field notes, etc., in the General Land Office. Among these records is a manuscript map which shows both the Macomb and Johnston monuments and a line running due south from the Johnston monument from latitude 37° to latitude 36° 30′. Major was instructed to join the Macomb and Clark monuments by a straight line. Instead of this he ran south from the erroneous Johnston monument and did not find Clark's monument. The manuscript map showing his results, drawn wholly in black, is 25½ by 38 inches in size and entitled:

Map of that portion of the | Southern Boundary of Colorado | between the 25th Mer. west from Washington, & the 103rd Mer. west from Greenwich | also of | that portion of the | Eastern Boundary of New Mexico | between the 36° 30′ & 37° 00′ Par. of North Latitude, | Surveyed by order of the Hon. Sec. of the Interior | by | John J. Major | U. S. Astronomer & Surveyor | 1874. | Scale: 2 Miles to an Inch.

CHANEY'S SURVEY, 1881.

Richard O. Chaney and William W. Smith, United States deputy surveyors, between October 19 and November 16, 1881, surveyed the Cimarron meridian, being the one hundred and third meridian of west longitude from Greenwich, between the parallels of 37° and 36° 30′.

This survey began with a telegraphic determination of longitude near Old Las Animas, Colo., in approximately latitude 38° 03′, longitude 103° 09′. Telegraphic signals were exchanged with Ormond Stone at Cincinnati, Ohio, on the nights of October 6 and 7, 1881. The station was a stone pier erected by the Government engineers "about 100 yards south of the railroad depot." Resulting longitude, 103° 08′ 41″ west of Greenwich. The conditions were unfavorable and the resulting longitude determination was correspondingly weak.

The computed distance of the one hundred and third meridian from this station was 7 miles 71 chains 20 links east. This distance was chained three times and the one hundred and third meridian was thus determined. From it Chaney chained south 73 miles 9 chains 42 links to the thirty-seventh parallel, where he erected a gray sandstone, 6½ feet long, 12 inches square, set 3½ feet in the ground, marked on the north face, "Colorado;" on the south face, "103 W L;" on the east face, "37 N L," and on the west face, "1881."

At this point begins the Cimarron meridian of the Land Office. From this, the north end of the Cimarron meridian, Chaney chained south 34 miles 26 chains 44 links to the vicinity of the parallel of 36° 30′. Here he observed the latitude to be 36° 30′ 11.9″, whereupon he chained 16 chains 24 links farther south and set a monument, in latitude 36° 30′, to mark the south end of the Cimarron meridian. This monument, located in latitude 36° 30′ and longitude 103° west of Greenwich, according to Chaney's observations, is a gray sandstone 6 feet long, 12 inches square, set 3 feet in the ground, surrounded by a mound of earth 5 feet in diameter, 2 feet high, with pits 24 × 24 × 12 inches north, south, east, and west of the stone, which is 6 feet distant, marked on the north face "C M;" on the south face, "103 W L;" on the east face, "36° 30′ N L," and on the west face, "N M."

It will be remembered that in 1859 Clark determined the intersection of the one hundred and third meridian with the parallel of 36° 30′, and erected there a monument to mark the northwest corner of Texas. Chaney in this survey sets a new monument at the same intersection as determined by his (Chaney's) observations. He then searched west for Government survey stakes or marks, but makes no mention of Clark's monument. According to Chaney's chaining, the Macomb monument is 2 miles 34 chains 28 links west of the north end of the Cimarron meridian. Chaney searched for three days south of Macomb's monument for the line closing on that monument without finding it.

From the south end of the Cimarron meridian, Chaney made search for the "east boundary of the Government surveys governed by the New Mexico meridian." His field notes set forth the details and conclude with the statement that the nearest corner found was a quarter post 2 miles 35 chains west of the Cimarron meridian. Ten miles farther north he renewed the search in company with a local ranchman, but no marks were found. Chaney's search was made over the ground where the monuments were set by Clark in 1859 and by Major in 1874 to mark the northwest corner of Texas. Yet he makes no reference to either of them.

This account is drawn up from the manuscript field notes of Chaney's survey, now on file in the General Land Office.

MABRY'S SURVEY, 1882–1885.

W. S. Mabry, county surveyor of Dallam, Hartley, and Oldham counties, Tex., retraced the Clark line from the Canadian River northward in 1882 to 1885, and built the XIT pasture fence. The record of his surveys is at Austin, Tex. Some information touching it will be found here under Preston's survey, 1900.

TAYLOR AND FUSS'S SURVEY, 1883.

On March 5 and 6, 1883, the contract surveyors, Taylor and Fuss, subdivided the fractional townships—Towns 13 and 14 N., range 37 E., New Mexico meridian. These surveys join and close on two monuments, being 15 and 16 of Clark, set in 1859 on opposite banks of the Canadian River to mark the one hundred and third meridian.

Map 8 of Clark's report[a] shows the crossing of the one hundred and third meridian and Canadian River. The location of the monuments is shown on the map, and the monuments are described in the text, where they are numbered 15 and 16. The accompanying fig. 2, made from Clark's map 8, shows the situation of these monuments as given by Clark in 1859. Fig. 3 shows the same as given by Taylor and Fuss on their manuscript plats submitted to the General Land Office in 1883. Taylor and Fuss also show on their plats the locations of the monuments and the course of the Canadian.

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[a] Sen. Ex. Doc. No. 70, 47th Cong., 1st sess.

Clark describes his monument 15, erected in 1859, as follows: "A mound of earth near the edge of a red sandstone bluff which forms the southern bank of the Canadian."

Taylor and Fuss describe the same monument as found by them in 1883 thus: "Monument, mound of earth and trench."

Clark describes his monument 16 thus: "This is of stone; in sight from No. 15, and on north bank of the river. The angle at which the line crosses the river is shown by these two monuments."

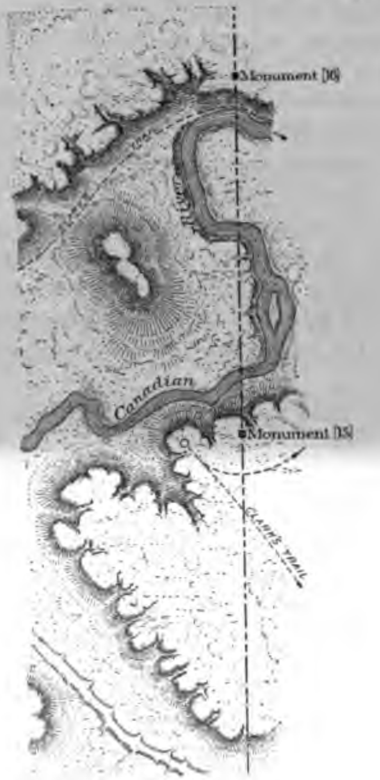

FIG. 2.—Clark's monuments 15 and 16 on the one hundred and third meridian (1859), from Clark's report, map 8.

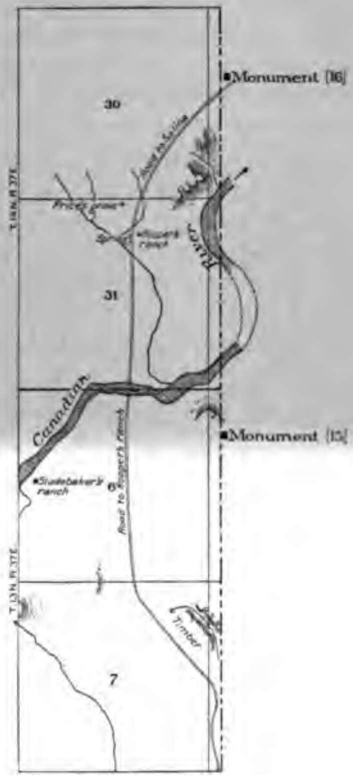

FIG. 3.—Clark's monuments 15 and 16, as given by Taylor and Fuss (1883), from original plats in General Land Office.

Taylor and Fuss describe the same monument as they found it in March, 1883, thus: "It consists of a trench about a foot in depth and width, dug in a circle of about 15 feet in diameter, with a mound of earth in center and several large sandstones, marks on which were indistinct."[a]

So far as the Land Office records show, these were the only monuments set by Clark on the one hundred and third meridian which have since been reported by United States surveyors or connected with the public land surveys, down to 1900. For later information *see Preston's* survey, 1900.

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[a] MS. field notes, New Mexico, vol. 51, p. 42, in General Land Office.

PRITCHETT'S SURVEY, 1892.

In 1892 Prof. H. S. Pritchett, then professor of astronomy and director of the observatory of Washington University of St. Louis, Mo., was employed by Texas to determine "with the utmost accuracy the location of the one hundredth meridian in its intersection with the Red River." This determination was desired by Texas for use in the famous lawsuit known as the Greer County case. Professor Pritchett made the desired determination and prepared a written report thereon. This report was printed in full in the record of the case.[a] As this record is a scarce document, only a few copies having been printed, Pritchett's report is here reprinted in full.

REPORT OF THE FIXATION OF THE ONE HUNDREDTH MERIDIAN.

The part of the one hundredth meridian forming the boundary between Texas and the Indian Territory was determined in 1857 by a United States surveying party. The last station fixed by that expedition is just north of the South fork of the Red river. The station was marked by a mound of stones, in the centre of which was placed a larger stone, marked "100 W.," and is known in that region as the "initial monument."

The nearest telegraph station to the monument is Childress, distant about eleven miles west and nine miles south.

It was necessary to determine the geographic co-ordinates of this point and then proceed to the fixation of the position of the meridian at the intersection of the Red river. The method of triangulation seemed best suited for this purpose. The longitude of Childress was determined on three nights by an exchange of clock signals with the observatory at St. Louis, the time observation at that point being made by my assistant, Mr. A. Ramel.

The transit instrument used at Childress was Wurdemann No. 20, the property of the United States Geological Survey, and kindly loaned by the director of the survey for this work. The instrument used at St. Louis was the Fauth transit of the observatory.

The observing station at Childress was placed in the northeast corner of lot 12, block 43, as shown on the town plat of Childress, the observing pier being 5.50 feet west and 2.33 feet south of that corner. The following determinations of the longitude refer to this pier:

Apparent differences of longitude from exchange of arbitrary signals.

Date.	Mean difference: clock faces.	Correction, St. Louis clock.	Correction, Childress chronometer.	Childress, west of St. Louis.
1892.	*m.* *s.*	*s.*	*s.*	*m.* *s.*
June 14	+36 37.544	+1.060	−200.652	39 59.256
15	+36 40.293	+1.323	−197.499	59.115
20	+36 50.264	+2.368	−186.590	59.222

Observing pier at Childress west of St. Louis transit pier—0 *h.* 39 *m.* 59.198 *s.*

Difference longitude St. Louis-Childress =0 *h.* 39 *m.* 59.198 *s.* ± .029 *s.*

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[a] Record, Supreme Court of the United States, October term, 1894. No. 4, original. The United States, complainant, *v.* The State of Texas. In equity, Vol. II, pp. 1194–1199.

The correction for personal equation between Mr. Ramel and myself was determined from a large number of observations made before and after the longitude xchange. The results before and after exchange were very accordant. The mount of this difference of personality was found to be $+0.2066s. \pm 0.0078s.$ taken n the sense P.−R.—that is to say, Pritchett observes the transit of a star later han Ramel by this amount. The correction is therefore to be subtracted from he observed longitude, giving as the final longitude of Childress with respect to St. Louis.

	h.	m.	s.
Longitude, Childress-St. Louis	0	39	58.991
Longitude, St. Louis-Greenwich	6	00	49.168
Longitude, Childress-Greenwich	6	40	48.159
	100°	12′	2.38″

LATITUDE OF CHILDRESS.

The latitude of Childress was determined by Talcott's method from observations f pairs of stars. The declinations of stars were taken from the Berlin Jahrbuch r from Safford's catalogue of mean declinations of 2,018 stars.

The resulting latitude of the observing pier is 34° 25′ 16.1″ ±0.46″.

The triangulation system commenced at a point in the meridian of the transit nstrument and 18.96 feet north of it, and this point is designated as Childress in he triangulation scheme. We have, therefore, for the co-ordinates of the initial oint of the triangulation the following values:

Co-ordinates of the station Childress.

	°	′	″
Longitude	100	12	2.38
Latitude	34	25	16.3

MEASUREMENT AND LENGTH OF BASE LINE.

As the basis of triangulation a base line was selected in the best available ground, starting at the station Childress and extending for about 0.8 miles east. The base was measured twice with a 300-foot steel tape, kindly loaned by Professor Johnson, of Washington university. The tape had been carefully compared with the standard of the Mississippi river commission and found to be for a stress of 16 pounds 300.349 feet $+ 300 \times 0.000007\ (t - 62^\circ)$.

This determination was made with the tape resting on a level surface, and the 100-foot divisions of the tape were also examined. In the measurement of the base the tape was allowed to rest on the ground, which was very smooth and at a nearly constant grade. A constant pull of 16 pounds was maintained by means of a spring balance. Marks were made with a pencil to mark the end upon stakes driven close down to the ground and having a surface some 3 inches in width. Two measurements of the base were made, the first on June 17th, during a very cloudy day, and the other on June 23rd, just after sunset. The temperature was read by a thermometer placed in contact with the tape. For correcting the measurement for error of grade a line of levels was run from the station Childress to the east end of the base and the inclination of each tape length determined. The altitude of the base was assumed from the railroad surveys to be 1,880 feet above sea level.

The following results were obtained for the length of the base:

June 17.—Measured length of base = 13 tapes + 101.0 feet. $t = 72.5^\circ$.

June 23.—Measured length of base = 13 tapes + 100.675 feet. $t = 84.5$.

Using the length of tape given above, there results:

June 17: Length of base	4,005.841	feet.
June 23: Length of base	4,005.844	"
Adopted length of base	4,005.842	"
Correction for grade	−0.167	"
Correction to reduce to sea level	−0.360	"
Reduced sea level length of base	4,005.315	"
	= 1,220.809	meters.

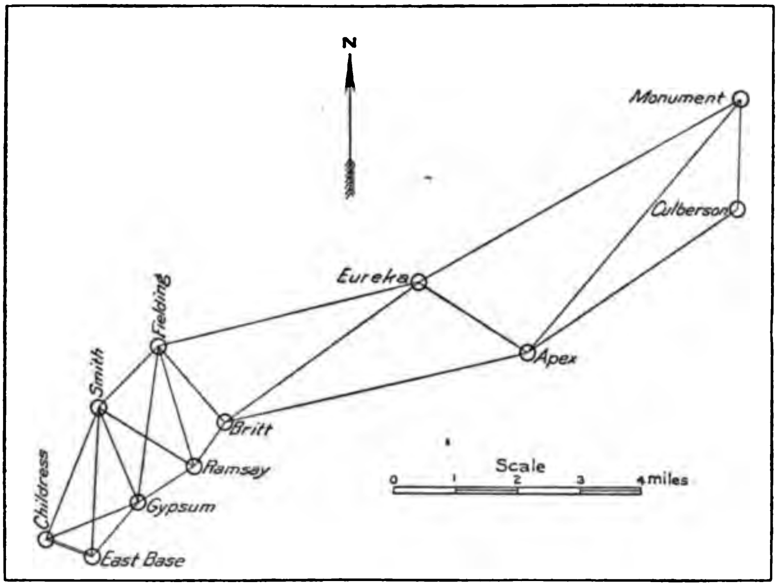

FIG. 4.—Diagram of Pritchett's triangulation near Red River (1892), from Record in the Greer County case, p. 1196.

The triangulation which connects Childress with the initial monument is shown in the accompanying sketch. It will be noted that the long sides of the triangles on the eastern end lie mostly north and south, so that errors in the sides would make but little difference in the longitudes of the stations. The stations Eureka and Apex are on the range of hills between Childress and the Red river, and the station Britt had to be so chosen that these could be seen through ravines in the intervening hills.

The angles of the triangles were measured with an engineer's transit having a six-inch circle divided to fifteen minutes and read by two verniers to twenty seconds of arc. The repeating method was used. The error of closure was quite satisfactory, the average error being 9″.

The two quadrilaterals at the beginning of the triangulation were not adjusted as quadrilaterals. Each triangle was adjusted for errors of closure only, and the mean of the independent results taken. The values of the measured angles are shown in the following table:

Triangle.	Measured angle.			Spher. Ex.	Adjusted angle.			Log. sines.	Log. sides in meters.
	°	′	″		°	′	″		
Smith	19	33	57.0		19	34	00.7	9.524924	3.086648
Childress	88	13	39.5		88	13	43.2	9.999792	3.561516
East base	72	12	12.5		72	12	16.1	9.978707	3.540431
Childress	42	2	00.0		42	1	55.6	9.825781	3.242318
East base	110	4	26.5		110	4	22.1	9.972785	3.389322
Gypsum	27	53	46.7		27	53	42.3	9.670110	3.086648
Smith	44	54	49.5		44	55	5.4	9.848864	3.389322
Childress	46	11	39.5		46	11	55.4	9.858384	3.398842
Gypsum	88	52	43.3		88	52	59.2	9.999018	3.540376
Smith	25	20	52.5		25	21	00.4	9.631594	3.242373
Gypsum	116	46	30.0		116	46	37.8	9.950738	3.561516
East base	37	52	14.0		37	52	21.8	9.788104	3.398883
Fielding	37	49	50.5		37	49	41.4	9.787670	3.398863
Smith	111	47	21.0		111	47	11.8	9.967816	3.579009
Gypsum	30	23	16.0		30	23	6.8	9.703989	3.315181
Ramsay	41	59	53.0		41	59	52.1	9.825492	3.398863
Smith	34	30	38.3		34	30	37.4	9.753243	3.326613
Gypsum	103	29	31.5		103	29	30.5	9.787846	3.561217
Fielding	70	23	35.9		70	23	35.5	9.974059	3.561217
Smith	77	16	42.7		77	16	42.3	9.989206	3.576364
Ramsay	32	19	42.5		32	19	42.2	9.728168	3.315326
Fielding	32	34	5.0		32	34	6.3	9.731030	3.326494
Ramsay	74	19	25.5		74	19	36.8	9.983545	3.579009
Gypsum	73	6	15.5		73	06	16.9	9.980838	3.576302
Britt	97	25	44.5		97	25	43.5	9.996339	3.576333
Ramsay	49	06	9.2		49	06	8.2	9.878453	3.458446
Fielding	33	28	9.2		33	28	8.3	9.741534	3.321527
Britt	95	35	15.0		95	35	16.3	9.997931	3.902710
Fielding	63	26	43.0		63	26	44.3	9.951586	3.856364
Eureka	20	57	58.0		20	57	59.4	9.553567	3.458446
Britt	22	40	44.6		22	40	47.0	9.586114	3.605649
Eureka	113	56	32.5		113	56	35.0	9.960922	3.980457
Apex	43	22	35.5		43	22	38.0	9.836829	3.856364
Eureka	61	27	44.7		61	27	44.7	9.943744	4.010350
Monument	20	14	28.4		20	14	28.4	9.539043	3.605649
Apex	98	17	46.9		98	17	46.9	9.995435	4.062041
Monument	38	59	3.0		38	59	1.9	9.798721	3.898182
Apex	15	33	21.0	0.1	15	33	19.8	9.428413	3.527874
Culberson	125	27	39.5		125	27	38.3	9.910889	4.010350

THE AZIMUTH OF THE LINE CHILDRESS-GYPSUM.

The azimuth of the line Childress-Gypsum depends on the azimuth of a meridian mark set up about three-fourths of a mile north of the observing pier. This mark was bisected by the mid wire of the transit instrument each night before commencing time observations; also special observations for it were made on June 22nd. The resulting observations showed the mark to be west of north 11.22″. A number of measures of the angle Meridian-Childress-Gypsum gave as the final azimuth of the line Childress-Gypsum 248° 21′ 27.8″.

With this initial azimuth the following geodetic positions of the stations in the triangulation were obtained:

Geodetic positions and azimuths in triangulation.

Stations.	Latitudes.			Longitudes.			Azimuths.			Stations.	Reverse azimuth.		
	°	′	″	°	′	″	°	′	″		°	′	″
Childress	34	25	16.3	100	12	2.38	248	21	28	Gypsum	68	22	18
							290	28	23	East base	110	23	49
							202	09	32	Smith	22	10	1
Gypsum	34	25	45.6	100	10	33.16	157	15	17	Smith	337	14	40
							260	44	41	Ramsay	80	45	27
Smith	34	27	0.6	100	11	11.09	225	27	41	Fielding	45	28	18
Ramsay	34	25	56.7	100	09	11.16	204	11	28	Britt	24	11	47
Fielding	34	27	47.7	100	10	13.38	301	36	37	Britt	121	37	31
Britt	34	26	58.8	100	08	37.51	239	53	34	Apex	59	53	53
Eureka	34	30	4.5	100	05	47.20	221	50	4	Monument	41	52	55
Apex	34	29	34.4	100	03	13.86	201	37	3	Monument	21	38	27
							217	10	23	Culberson	37	12	9
Monument	34	34	43.4	100	00	45.33	312	39	25	Culberson	162	39	47
Culberson	34	32	58.9	100	00	5.90							

The station "monument" was 6.8 feet east and 1.2 feet south of the initial monument.

We have, therefore, the following final positions for the initial monument and the station Culberson:

	°	′	″
Longitude, initial monument	100	00	45.41
Latitude, initial monument	34	34	43.4
Longitude, Culberson	100	00	5.90
Latitude, Culberson	34	32	58.9

The initial monument is, therefore, shown to be 45.41″ west of the one hundredth meridian, equivalent at this parallel of latitude and at the assumed altitude to 3,797.3 feet.

Similarly the station Culberson is 5.90″ west of the one hundredth meridian, equivalent to 493.5 feet, and the final monument to mark the one hundredth meridian should, therefore, be placed 493.5 feet east of station Culberson.

PROBABLE ERROR OF THE RESULT.

The probable error of the final determination involves the probable errors of the longitudes Greenwich-St. Louis, St. Louis-Childress, and Childress-Culberson. The last-named, which depends on the triangulation, may be assumed as insignificant in comparison with the other two. The probable error of the difference St. Louis-Childress as found above is ± 0.029s., and that of the difference St. Louis-Greenwich is estimated as ± 0.05s., the uncertainty lying almost wholly in the transatlantic determination. The probable error of the final result is, therefore,

$$\pm\sqrt{(0.05)^2+(0.029)^2}=\pm0.058\text{s.}=\pm0.87''=\pm73 \text{ feet.}$$

This probable error can not be appreciably reduced without a redetermination of transatlantic longitudes.

H. S. PRITCHETT.

PRESTON'S SURVEY, 1900.

On October 25, 1899, Mr. Levi S. Preston, United States deputy surveyor, entered into a contract (No. 336) with the General Land Office to execute certain land surveys in New Mexico near the north and west boundaries of Texas. Among other things, Preston was to carefully redetermine or retrace Clark's line along the northern part of the one hundred and third meridian and connect his surveys therewith. This work he did (between July 11 and 18, 1900) with such zeal, intelligence, and faithfulness and reported his results (on May 7, 1901) with such clearness that much of the doubt and uncertainty which had long existed has been cleared up. So far as Preston's work relates to the west boundary of Texas, it may be briefly summarized as follows:

Starting with a Gurley transit at Clark's monument 15 on the south bank of the Canadian, he surveyed northward 76 miles, retracing Clark's line to the northwest corner of Texas. He also prolonged this line 34¼ miles farther north to its intersection with the south boundary of Colorado, and from that point of intersection measured westward to the Johnston and Macomb monuments and eastward to the Cimarron meridian; also from the northwest corner of Texas, as now locally recognized and adopted, he measured eastward to the Cimarron meridian (south end) and westward to the supposed locality of the Major monument of 1874, which, however, he did not find. Clark's monuments on the one hundred and third meridian, from the one on the south bank of the Canadian northward to the corner, are numbered (in Clark's report) 15 to 26, inclusive. Of these, Preston identified 15, 16, and 17 certainly, 20 doubtfully, and 26, the corner one, not at all as a monument, but satisfied himself that the present fence corner of the pasture of the XIT or Capital Land and Cattle Company is at or very near Clark's corner monument. He also reports that there is no trace of monument 24.

The story of Preston's survey we shall now tell somewhat more at length and mostly in his own words. The records from which this story is derived are chiefly his Special Instructions, consisting of 24 typewritten foolscap pages, typewritten transcript of his field notes, and the accompanying plat, all now on file in the General Land Office.

At page 9, of the Special Instructions, Preston is directed thus:

"In the event that you can identify and locate the northwest corner of the State of Texas as established by the United States and Texas commission, which should be done by proving such corner by running west on the north boundary and north on the west boundary of Texas," you will do one thing, "but in the event that you can not *identify* and locate the said corner and boundary," you will do some-*thing else*.

At page 9½ the Instructions continue:

> In 1874 Mr. Major, who established a portion of the east boundary of New Mexico, between 36° 30′ and 37° North Latitude, ran south from the old Johnson monument, on the north boundary of New Mexico, for a total distance of 34¼ miles, where he established a monument for the northwest corner of Texas. As Major, in 1874, could find no trace of the old Clark monument and northwest corner of Texas, there seems little probability of identifying this point at the present time. Therefore in order to locate such northwest corner of Texas, and the southern boundary of the strip lying west of the Cimmarron Meridian, a line should be run due west from the initial point of said meridian to a point due south of the Johnson monument and on this line the surveys may be closed from the north, and Major's monument should not be used if found.
>
> The distance between the Johnson monument and the intersection of the Colorado-New Mexico boundary line with the Cimmarron Meridian should be ascertained by remeasurement and this distance, allowing for divergence of meridians, may be adopted in setting off the southern boundary of this strip to be run west of the initial point of said Cimmarron Meridian. This will avoid the necessity of running due south from the Johnson monument to fix the position of the line of the southern boundary of the strip, as there appears to be no other feasible method of identifying the west boundary of Texas as surveyed by Clark, and confirmed by Congress, without retracing an indefinite and at present unknown, part of the boundary, involving much time and expense.

And finally, on page 17 of the same Special Instructions, Preston is told that—

> It is more than likely that some of the exterior lines of townships heretofore established and of the grant line on which one of your surveys will close, and of the eastern boundary of New Mexico and Cimmarron Meridian and the western boundary of Texas are in a very bad condition or the corners obliterated on the ground, and it is very necessary for you to retrace and reestablish some or all of said lines in order to properly execute your surveys and in order to prove your surveys correct, and said lines should be so far retraced and reestablished (if you conclude the same to be absolutely necessary) as will show conclusively where the errors, if any, exist.

Under these instructions and provided with a Gurley transit, reading to minutes, Preston began his work. In May, 1900, he retraced the range line between ranges 36 and 37, from the vicinity of the northwest corner of Texas northward to the Colorado line, about 35 miles, and between July 11 and 18, 1900, retraced Clark's line from the Canadian northward to the northwest corner of Texas, about 76 miles.

In his field notes, received by the General Land Office May 7, 1901, he says:

> I retraced Range line between ranges 36–37 E., running north through townships 26 to 32 North (i. e., from latitude 36½° to 37°, near the one hundred and third meridian) and intersected the Colorado and New Mexico boundary line in May, 1900, at a point 48.83 chains east of the monument erected by Captain Macomb in 1859 for the northeast corner of New Mexico.
>
> From the Macomb monument I ran west and at 1 mile 68.15 chains found the Johnson monument established in 1857.

> 38 NORTHWEST BOUNDARY OF TEXAS. [BULL. 194.
>
> The Johnson monument I found to consist of a circular trench 24 feet in diameter, 6 inches deep, and 2 feet wide, with the remains of an old mound in the center about 15 feet in diameter and 1 foot high, the whole grass grown. Lying on the ground I found a stone marked, "Major 1874," "N. M. 103° L., 37° L.," evidently the stone set by Mr. Major in 1874, as mentioned in letter "E" of July 16, 1887, from the Commissioner of the General Land Office supplied me by the Surveyor General.
>
> Also from the Macomb monument I ran east and intersected the Cimmarron Meridian at 2 miles 40.53 chains, making the total distance between Cimmarron Meridian and the Johnson monument 4 miles 28.68 chains. This distance was carefully chained twice over and is correct within a few links at most.
>
> * * * * * * *
>
> I ran west from the southwest corner of Oklahoma, as established by Chaney and Smith in 1881 a distance of 4 miles 28.68 chains, * * * searching as I went, but failed to find any old corners as established by either Clark in 1859 or by Major in 1874. But at 2 miles 14.65 chains west of Cimmarron Meridian and 5.47 chains south I found the northwest corner of XIT pasture fence, accepted by the State of Texas and by Dallam County, Tex., as the northwest corner of the State.
>
> From this fence corner the State of Texas has initiated surveys running east and south and dividing the XIT lands into leagues, and have set stones for some distance at each one-fourth league, or 53 chains, marked with paint XIT on south and east faces as the case may be.
>
> According to my traverse this fence corner is 2 miles 14 chains east of the Johnson monument.
>
> In 1859 Captain Macomb was instructed to establish a new monument for the one hundred and third meridian at 11,582 feet, or 2 miles 15.50 chains, east of the Johnson monument. * * * While John H. Clark ran south from the Johnson monument in 1859, several months prior to the establishment of the Macomb monument, it is very probable that he was supplied with the information from Washington that the Johnson monument had been determined to be 11,582 feet too far west.
>
> Clark was at Fort Union after supplies at this time and in direct communication with Washington, and it would be strange if he were not supplied with the information.

Preston's conclusions here are valid, although when writing he was evidently not aware that it was Clark himself who made the lunar observations and the computations from which it was concluded that the Johnston monument was placed 11,582 feet too far west. Clark, therefore, was, without communicating with Washington, in possession of the data for setting his Texas corner post on the one hundred and third meridian in 1859, in accordance with the results of his own astronomical work in 1857.

Preston continues:

> If this were the case then Clark did what Captain Macomb failed to do, as the fence corner is within 1½ chains of a point 11,582 feet east of the Johnson monument, while the Macomb monument is still 26.35 chains west of where Captain Macomb was instructed to establish it.
>
> From this fence corner I ran east 17 miles [and] south 11 miles as per the plat and notes furnished me by the Surveyor General, but failed to find any old monuments, as both Johnson and Captain Macomb had failed to establish their monuments correctly.

> Professor Darling, Major, Chaney, and Smith and Brown had all failed to recover or reestablish the west boundary and northwest corner of Texas, and Surveyor General Vance, at Santa Fe, had exhausted his resources in supplying me with information in regard to this boundary, but urged the necessity of recovering the west boundary and northwest corner of Texas, so as to settle for all time the closings of the public land surveys of New Mexico on the Texas and Oklahoma boundaries, which closings had been in a state of uncertainty and dispute for forty years past. Hence I set to work to solve the problem regardless of time or expense. I rode 200 miles on horseback, interviewing "old timers" who had assisted in building the XIT fence. I went by rail to Channing, Tex., to interview the manager of the XIT, or Capital Land and Cattle Company, and there got track of Mr. W. S. Mabry, who retraced the western boundary of Texas and built the XIT fence in 1882 to 1885. Mabry was at San Antonio, Tex., but I wired him to meet me, which he did on June 10 [1900]. From him I received a copy of the retracement of the old Clark survey in 1882 to 1885, which gave one connection with the public surveys of New Mexico, and received much information in regard to the history of Clark's survey and of the old monuments on the western boundary of Texas. I learned that no monuments were to be found north of the north bank of the Canadian River in T. 14 N., R. 37 E., and possibly none north of the bluffs of the Llano Estacado, in Ts. 8 or 9 N., R. 37 E., of New Mexico Principal Meridian.
>
> It seems that prior to 1880 the XIT, or Capital Land and Cattle Company, had had their lands subdivided into leagues, and on Mabry's retracement of the Clark survey, in 1882 to 1885, he found these "Capital leagues" extending over into New Mexico. The extent of this conflict Mabry ascertained, and the State of Texas granted the Capital Land and Cattle Company other lands in Texas, equal to the amount of this conflict.
>
> All this is matter of record and history at Austin, Tex.
>
> Supplied with this information, and having completed all the surveys in this part of New Mexico under my contract No. 336, except the closings onto Texas boundary, I left Kenton, Okla., on July 5th, 1900, intending to go south as far as the Llano Estacado, if necessary, and reached the Canadian on July 10th, where I found three of the monuments of the Clark survey [Nos. 15, 16, and 17], as described by Mabry.

Preston continues:

> [On July 11, 1900] with the assistance of Mr. Ritter, of Red River Springs, who has lived on the Canadian near the Texas line since 1880, I found two old monuments on the mesa north of the Canadian and one on the mesa south. I set a flag pole in center of the extreme north monument [Clark's 17] and at the monument south of the Canadian [Clark's 15], which I found to be a circular depression in the ground 16 feet in diameter, with slightly higher ground in center of same, partly overgrown with grass and amole plants and agreeing in description and position with Mr. Mabry's description, as it was in 1885, and with the copy of Clark's plat of 1859.
>
> * * * * * * *
>
> I set up over stone in center of old monument on mesa south of Canadian river [Clark's 15]. Sight on signal one and one-half miles northerly [Clark's 17] and run north on course of old monuments on resurvey of old line.

From Clark's monument 15 to Clark's monument 16 Preston finds the distance by chaining to be 1 mile 36.25 chains, and Clark's 16 bears from Clark's 15 N. 0° 09′ W., true, from observation on Polaris at E. elongation. From Clark's monument 15 to Clark's monument 17 is 1 *mile 63.70 chains*, and the bearing N. 0° 09′ W., true.

Clark's monument 16 is thus described:

> An old monument on state line, a circular trench 20 feet in diameter, 1 foot deep, 3 feet wide, with mound of gravel in center, 14 feet in diameter and 3 feet high, with bunches of grass and amole plants growing on same, evidently one of Clark's old monuments, and agrees with copy of Clark's old map of 1859 and Mabry's description.

Clark's monument 17 is thus described:

> An old mound on state line, a circular trench 20 feet in diameter, 6 inches deep and 2 feet wide, with mound of gravel in center, 15 feet in diameter and 1½ feet high, with bunches of grass and amole plants, evidently one of Clark's old monuments, and agrees in position with copy of Clark's old map of 1859 and Mabry's description.

At a point 39 miles 60 chains N. 0° 09′ W., true, from Clark's monument 15, Preston finds:

> A sandstone 6 × 8 × 6 inches above ground, marked "XIT" on east, "NM" on west, and "1885" on top, bearing east 86 links distant, situate on fence line.
>
> Mabry describes finding traces of one of Clark's monuments in 1885 at about this point, which is some 60 chains south of the Tramperos arroyo, or Major Longs Creek, and which monument he had United States Deputy Surveyor Unruh tie in to the Range line. Unruh gives tie as 39 chains south, 56.45 chains east of the corner to sections 12-13, on line Rs. 36-37 E. in T. 20 N. Mabry does not mention setting this stone, but either he or Unruh evidently set it here in the old mound to preserve the position of same. All trace of the old Clark monument is obliterated. * * *

He continues:

> I am now satisfied with the identity of this stone on state line as being the position of one of Clark's old monuments as described by Mabry.
>
> This monument [Clark's 20] is 36 miles 76.30 chains north of the last old monument [Clark's 17] on north bank of the Canadian, and the falling is 86 links west or 1 minute in course. Hence, true course from Canadian monument to Tramperos monument [Clark's 20] is N. 0° 08′ W.
>
> I set over stone in monument in longitude 103° 02′ W. and latitude 35° 57′ N. and correct course to N. 0° 08′ W., and continue on state line over sand hills in Tramperos bottom or valley.

* * * * * * *

In 1882 W. S. Mabry, then county surveyor for Dallam, Hartley, and Oldham counties, Tex., proceeded to re-trace the north and west boundary of the State of Texas, and began said survey from the northwest corner of the State, and tied in to the Smith and Chaney monument at southwest corner of Oklahoma, as per following copy of his field notes:

"March 31st, 1882, begin at northwest corner of Texas, which is a large mound of earth with circular trench and a cedar post 12 inches square 6 feet high, marked 'T L 36° 30′ *a* 1859' on one side, and on the opposite side marked 'N. M. L. 103° *a* 1859.'[a] Same being the northwest corner of the Panhandle of Texas."

Thence east, crossing a drain at 3,443 varas, to mound and three pits, the northeast corner of league No. 1. Thence north 79° 30′ E., 703 varas, to large stone monument marked "C. M. 103°-36° 30′ & 1881."

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[a] *Evidently* this means T[exas] L[atitude] 36° 30′ a[nno] 1859 and N[ew] M[exico] L[ongitude] *a[nno] 1859.*

As the vara used in Texas is taken to be 33⅓ inches long, or 4.21 links, this tie gives a distance of 2 miles 14.05 chains east and 5.39 chains north as the distance between northwest corner of XIT fence and the southwest corner of Oklahoma.

I made total distance 2 miles 14.65 chains east and 5.47 chains north, as previously described in these notes.

I made search for evidence of old corners, but there were none, other than at the XIT fence corner, where the ground is bare and hard over a circular area of some 20 feet in diameter, but whether from an old mound of earth or simply from cattle tramping around the fence inside and out of the pasture I was unable to determine. However, this fence corner is but one-half minute of course west of a line running N. 0° 08′ W. from the Canadian through the Tramparas [sic] monument; that is, course from Tramparas monument to fence corner is N. 0° 08′ 30″ W., a distance of 37 miles 42.35 chains.

At this northwest corner of the XIT pasture fence I remove wire fencing, dig up the corner post, which I find set 18 inches in the ground, and set on top of the rotted stump of an old cedar post. Excavating carefully around this old stub, I find the bottom of it at 26 inches below surface of ground, and remove a segment of the old post 8 inches in diameter and 8 inches long, greatly decayed and reduced almost to a dry pulpy ash. The dark mould and pieces of decayed cedar indicated that the original post was about 10 × 12 inches in diameter at bottom.

This old cedar post could easily have been in the ground more than the eighteen years since 1882, and very likely for ten years longer.

This point being almost on true alinement with the old Clark monuments found 37 miles and 75 miles south, agreeing very closely with Mr. Mabry's tie of 1882, and within 150 links of the proper position east of the Johnson monument, as determined in 1858 and 1859, therefore

I set a sandstone 60 × 12 × 10 inches 36 inches in the ground for the northwest corner of the State of Texas, marked $\frac{\text{“N. W. Cor.}}{\text{Texas,”}}$ on east; “N. M.,” on west; “1859,” on south, and “1900,” on north faces.

I dig two pits 36 × 36 × 12 inches south and east of corner, 12 feet distant, so as not to deface the surface of the possible old circular trench and mound, and raise mound of earth and stone 5 feet base 2½ feet high southeast of corner.

From this corner the south and highest peak of the Rabbit Ears bears N. 78° 53′ W.

* * * * * * *

In the retracement of a portion of the boundary line and the establishment of the northwest corner of Texas I have endeavored to carry out my "Special Instructions" to establish said northwest corner "by running west on the north boundary and north on the west boundary of Texas."

As I was unable to obtain an original copy of John H. Clark's report of his survey of 1858–1859, I obtained what information I could from private sources and then succeeded in verifying such information by actual explorations and surveys on the ground.

However, there are three sources of information on record in the Department in Washington or at Austin, Tex., which should verify my retracement of the Texas boundary, but these records I had neither the time nor the expense allowance necessary to obtain, viz:

First.—The report of United States Commissioner John H. Clark on his survey of the Texas boundary in 1858–59, and probably entitled "History of the one hundred and third meridian."

Second.—Field notes of the survey of Exterior or of the subdivision lines of T. 20 N. of R. 36 E., by Unrah (or Unrah and Davis), 1885.

Third.—Plat and estimates of conflict of "Capital leagues" with the Texas State line, by W. S. Mabry, 1885, filed at Austin, Tex.

LEVI S. PRESTON,
United States Deputy Surveyor.

Such is the story of the northwest boundary of Texas as told by Preston. The field notes of the survey by Unruh in 1880 (not 1885, as Preston writes) I have examined, but find therein nothing bearing on the Texas boundary. The records at Austin, Tex., I have not seen.

DISCUSSION.

BOUNDARY ON THE ONE HUNDREDTH MERIDIAN.

THE LAW.

The east boundary of the panhandle of Texas is established by law to be that part of the one hundredth meridian, of west longitude from Greenwich, included between Red River and the parallel of 36° 30′. The earliest reference to any part of the one hundredth meridian as a boundary was made in 1821. In the treaty between Spain and the United States of February 19 of that year, the boundary between the United States and the Spanish possessions was defined, in part, as beginning at the mouth of the Sabine River and continuing along the western bank of that river to the thirty-second parallel; "thence by a line due north to the degree of latitude where it strikes the Rio Roxo of Natchitoches, or Red River; then following the course of the Rio Roxo westward to the degree of longitude 100° west from London and 23° from Washington; then crossing the said Red River and running thence by a line due north to the River Arkansas," etc.

In 1850 Texas agreed that the northeast corner of the panhandle should be at the intersection of the parallel of 36° 30′ and the one hundreth meridian west of Greenwich.[a]

In 1858 provision was made for running and marking the boundaries between the United States and Texas. That act defined the east boundary of the panhandle as "beginning at the point where the one hundredth degree of longitude west from Greenwich crosses Red River and running thence north to the point where said one hundredth degree of longitude intersects the parallel of 36° 30′ north latitude," etc.

Such is the line on paper. In 1859 the line was surveyed and marked on the ground. How well the surveying was done and how nearly these marks conform to the language of the law we shall now consider.

ORIGINAL SURVEYS.

Messrs. A. H. Jones and H. M. C. Brown were contract surveyors employed by the Indian Office just prior to the civil war to survey the boundaries of certain Indian lands. They entered into a contract with the Indian Office for this purpose late in 1857. On November 3, 1857, Daniel G. Major was appointed astronomer for the Indian boundary surveys. In the spring of 1859 Jones and Brown started from a monument, which still exists on the north bank of Red River and which, according to moon culmination observations made by Major in January, February, and March, 1859, is on the one hundredth meridian of west longitude from Greenwich. From this point they surveyed northward, setting monuments at every mile. The whole distance from Red River to the northeast corner of the panhandle is 133 miles. Of this distance, starting at the south end, Jones and Brown surveyed and marked about 110 miles. Their line ended at 109 miles, 56 chains, 54 links from the starting point on Red River. Their "terminating monument" was set about 19 miles north of the Canadian River. The remaining 23 miles was surveyed by Clark in June the following year. Clark arrived June 8, 1860, at the point where Jones and Brown's line crosses the Canadian River. He first followed their line northward 19 miles to its end and then prolonged it 23 miles further, to its intersection with the parallel of 36° 30′, i. e., to the northeast corner of the panhandle. In this stretch he erected four monuments. This count includes the one at the end, marking the northeast corner of the panhandle. In going over that part of the Jones and Brown line north of the Canadian, 19 miles, Clark found that many of the mounds set the previous year had been destroyed. Rains had washed away some of those located in hollows and buffaloes had destroyed others.

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[a] Statutes at Large, Vol. IX, p. 448.

As a check on the longitude of the northeast corner Clark prolonged his extension of the Jones and Brown line about 35 miles farther north, to the south boundary of Kansas. He intersected that line about 1,700 feet east of the one hundredth meridian as determined by himself when employed in the Johnston party of 1857.

SUBSEQUENT SURVEYS.

Since the original surveys of this line all the lands adjoining it on the east have been surveyed and subdivided. In 1873 Mr. C. L. Du Bois, now of the General Land Office, surveyed six townships adjoining this boundary at its south end. In the stretch of 36 miles covered by Du Bois's survey the one hundredth meridian, as laid down by Jones and Brown, is found to bear generally about half a degree east of north. This fact rests on solar compass observations. Subsequent surveys farther north show continuance of the same thing for some 70 or 80 miles, after which this deflection largely disappears and the line runs north. The Land Office meridians agree as to this. These meridians were laid down independently of the Jones and Brown line, and they converge toward it much more than the true convergence.

Prof. H. S. Pritchett, now president of the Massachusetts Institute of Technology, determined, telegraphically, the longitude of the south end of this line on June 14, 15, and 20, 1892. In the famous Greer

County case, United States *versus* Texas, Pritchett was employed by Texas to determine as accurately as possible the longitude of the monument on the north bank of Red River, set in 1859 to mark the one hundreth meridian. This he did, and found its longitude to be 100° 00′45″.71 west of Greenwich or 3,797.3 feet west of the one hundredth meridian.

FUTURE SURVEYS.

At its last session, Congress passed an act, approved January 16, 1901, directing the Secretary of the Interior "to cause to be established and fixed the intersection of the true one hundredth meridian with Red River * * * by the most accurate and scientific methods, and at said intersection cause a suitable monument to be erected on the ground."[a]

CONCLUSION.

1. The northeast corner of the panhandle of Texas is fixed by law at the intersection of the parallel of 36° 30′ and the one hundredth meridian west of Greenwich.

2. This point was located by Clark, in June, 1860, and a monument was erected to mark it.

3. Congress confirmed a part of Clark's survey in 1891, such confirmation including his monument at the northeast corner of Texas.

4. Subsequent surveys, though inconclusive, make it probable that the said Clark monument was established a little to the west—say 1,000 feet more or less—of the one hundredth meridian.

5. The monument on the north bank of Red River, set by Major in 1859, to mark the eastern boundary of Texas at that point, is 3,797 feet west of the one hundredth meridian.

6. By subsequent public land surveys, approved by the General Land Office, said monument on Red River has been accepted as marking the Texas boundary line at that point.

7. Those boundary monuments, which are northward from this one and which were set by Jones and Brown in 1859, have been accepted in the public land surveys as boundary monuments of Texas.

8. Said monuments were, by order of the Secretary of the Interior, accepted by Clark in 1860 as marking the east boundary of the panhandle.

9. Said monuments are accepted by local residents as the boundary monuments between Texas and Oklahoma.

10. So far as I know, Texas has never accepted or disputed these monuments.

11. To conform to these conclusions the boundary should, until better information is available, be drawn on maps as follows:

The northeast corner of the panhandle should be located on the parallel of 36° 30′ and about 1,000 feet west of the one hundredth meridian; thence a line should be drawn directly south, parallel to the one hundredth meridian, to a point about 50 miles south of the starting point; thence a line (about 80 miles long) should be drawn southward to Red River, intersecting it at a point 3,800 feet west of the one hundredth meridian.

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[a] Statutes at Large, Vol. XXXI, p. 732.

BOUNDARY ON THE ONE HUNDRED AND THIRD MERIDIAN.

THE LAW.

On September 9, 1850, an act of Congress was approved, by which the one hundred and third degree of west longitude from Greenwich was fixed as the western boundary of the panhandle of Texas. This is the original act creating the boundary.

Another act of Congress, approved June 8, 1858, provided for surveying and marking the line, which is 310 miles long. Pursuant to this act 180 miles, or about 58 per cent of the line, was surveyed and marked by monuments in 1859.

By the sundry civil act of March 3, 1891, said survey of the boundary on the one hundred and third meridian was confirmed by the United States. The act declares that "the boundary line between said public land strip and Texas, and between Texas and New Mexico, established under the act of June 5, 1858, is hereby confirmed.

It does not appear that Texas has ever confirmed or disputed the line thus established, surveyed, marked, and confirmed.

ORIGINAL SURVEY.

The original survey was made by John H. Clark, United States commissioner and surveyor, in 1859. The Texan commissioner, Mr. Scurry, accompanied him during a part of the work.

The longitude of the south end of the line, where it meets the thirty-second parallel, was determined as follows: The station Frontera, of the Mexican boundary survey, near El Paso, was accepted and its longitude was transferred by triangulation and chaining about 12 miles northward to a point on the thirty-second parallel. The party then chained eastward 211 miles along that parallel to its calculated intersection with the one hundred and third meridian. Here they set a monument, from which they ran northward for 24 miles, erecting three monuments, or mounds, on the one hundred and third meridian north of the corner.

Clark then left the line, from lack of water, and went to its northern end, the northwest corner of the panhandle. The longitude of this corner he determined by transfer from the Kansas boundary. The Kansas boundary here referred to, it will be remembered, is the thirty-seventh parallel of north latitude, being about 34½ miles north of the corner he was to establish. Clark was the astronomer in Johnston's party, which two years before had set the so-called Johnston monument to mark the one hundred and third meridian. That monument had been erected at a point determined by chaining westward from the western boundary of Missouri 471 miles, the calculated distance of the one hundred and third meridian from the western boundary of Missouri along the thirty-seventh parallel. As a check on this long line measured by chaining, moon culmination observations were at once made by Clark near the one hundred and third meridian. These observations indicated that the Johnston monument was about 2¼ miles west of the one hundred and third meridian.

The results derived from the astronomical observations were accepted as being more accurate than those derived from chaining, and accordingly Captain Macomb was instructed to set a new monument on the thirty-seventh parallel, 11,582 feet east of the Johnston monument, to mark the southwest corner of Kansas at the intersection of the thirty-seventh parallel and the one hundred and third meridian. Pursuant to instructions, Captain Macomb did, in November, 1859, erect such monument on the thirty-seventh parallel to the eastward of the Johnston monument. Macomb's monument was set in November, 1859. The transfer of longitude from the thirty-seventh parallel of latitude south to 36° 30′ on the one hundred and third meridian was made by Clark's party in September, 1859. This was before the erection of the Macomb monument and after the erection of the Johnston monument, the longitude of which Clark had himself, by astronomical observations, determined to be 103° 02′ 22.7″. It has been supposed, or rather assumed, that Clark set the northwest corner post of Texas due south of the Johnston monument, and thus in longitude 103° 02′ 22.7″ instead of in longitude 103°. Such assumption appears to be purely gratuitous. In the absence of all evidence and all probability to the contrary, we are not warranted in assuming that he did not use his adopted astronomical result.

Clark did not transfer the longitude of the Johnston monument. What he says is that "the surveying party was sent over to the Kansas boundary, and taking up the one hundred and third meridian *as then established* transferred it," etc. He did not take up the Johnston monument as then established, but the one hundred and third meridian as then established and which he had himself nearly two years previously determined to be 2′ 22.7″ (equal, by his calculation, to 11,582 feet) east of the Johnston monument. This establishment of the one hundred and third meridian had been adopted by the United States engineers, and orders were issued to Macomb to set a new monument to mark it—a monument to take the place of the Johnston monument.

Clark did more. To test the accuracy of the transfer of longitude for this important corner, he established his camp on Rabbit Ear Creek, near the corner, and there, on seven nights in August, 1859, he observed transits of the moon and of stars. Thus the data was *obtained* for an independent check on the longitude. Of these observations, however, no use has been made. In the hurried closing of his work he reported that they were not essential for constructing the maps, and were therefore not worked up. He adds: "They can be computed hereafter if desirable."

I have examined these observations with a view to computing the longitude which Clark thought might "be computed hereafter if desirable." The original record has not been found, and the only material available is that printed in 1882 in the Clark report[a] (pp. 252–261). The copy from which the printer set up these pages is said to have been Clark's original record, which, I am informed, was sent to the Public Printer and never returned. In the absence of that record, and in the absence of information as to the azimuth and collimation corrections, and also in view of the weakness of any determination by the moon culmination method, it was not deemed worth while to work up these observations.

The astronomical station where these observations were made lies to the northwest of the northwest corner of Texas, about 8 miles distant. The connection between these stations was made on August 8, 12, and 17, 1859, and the result was as follows:

Clark's monument at the northwest corner of Texas bears from his astronomical station on Rabbit Ear Creek east 37° 53′ south, distant 7 miles and 5,252 feet.[b]

From the northwest corner of Texas the line was run south for 156 miles, the meridian being traced with a large theodolite, and the distances measured and checked by latitude observations. The longitude, however, depends wholly on the northwest corner.

SUBSEQUENT SURVEYS.

A part of the boundary surveyed and marked by Clark in 1859 along the one hundred and third meridian has been twice retraced. The part so retraced, about 76 miles long, lies between the Canadian River and the northwest corner. The first retracing was made by W. S. Mabry, county surveyor of Dallam, Hartley, and Oldham counties, Tex., in 1882–1885. The records of this survey, which I have not seen, are said to be in Austin, Tex. The second retracing was by Levi S. Preston, United States deputy surveyor, in 1900. This survey indicates an error of azimuth of about 8′ in the original survey, by which its direction was made N. 0° 8′ W. In these two surveys four of Clark's monuments were identified, three certainly, and one doubtfully. Those certainly identified are near the Canadian, being 15, 16, and 17 of Clark. The doubtful one is No. 24 of Clark.

Monuments 15 and 16 were also identified by Taylor and Fuss in 1883. None of the surveys by Mabry, or by Taylor and Fuss, or by Preston, add any information as to the longitude of this line. Mabry, in or about 1882, set a post to mark the northwest corner of Texas. Eighteen years later, in 1900, Preston dug up this post and found below it the rotted stump of an old cedar post, which he deemed older than Mabry's post.

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[a] Sen. Ex. Doc. 70, Forty-seventh Cong., 1st sess.

[b] Same, pp. 86–88.

In 1874, fifteen years after Clark's monument at the northwest corner was built, it was searched for by John J. Major, who, failing to find it, reestablished it, or rather set a new one. In such reestablishment Major made the mistake of setting it due south of the erroneous Johnston monument. Major, though aware of the erroneous location of the Johnston monument, quite overlooked this fact till after his work was completed and he had returned to Washington. Such is the statement that I have derived from conversations with present employees of the Land Office, a statement corroborated by Major's map. Both John J. Major and his brother Daniel G. Major died several years ago within a few days one of the other. Any information derivable from them is, therefore, not available. His boundary monument has disappeared; at least I so infer, as I find no mention of it in any subsequent record.

In 1881 Richard O. Chaney, by independent astronomical observations, determined the intersection of the one hundred and third meridian and parallel of 36° 30′ and set a new monument to mark the south end of the Cimarron meridian and the point declared by the law to be the northwest corner of Texas. Having built the monument, he made search for the "east boundary of the Government surveys governed by the New Mexico meridian." His search was made over the region where Clark and Major had previously built monuments, yet he makes no mention of them and evidently did not find them.

Again, in 1900, Preston carefully went over the ground in the vicinity of the Clark and Chaney monuments. He found the corner now locally recognized as the northwest corner of Texas near or at the point where Clark's monument should be, and he also found Chaney's corner. They differ in longitude by more than 2 miles. The Clark corner is, according to Clark, in longitude 103°. The Chaney corner is, according to Chaney, in longitude 103°. One of them is surely wrong and probably both are, and yet Clark's monument, confirmed by Congress, is the de facto corner. Clark's determination was a fairly good one by a weak method; Chaney's a weak determination by a strong method, and the need of a new and strong longitude determination in this vicinity is obvious. The relations of the various monuments here discussed are shown in the accompanying diagram (fig. 5).

FUTURE SURVEYS.

In view of the foregoing it is obvious that our knowledge of the location of the west boundary of the panhandle is very imperfect and unsatisfactory, and that, in consequence, topographic surveys and maps should be made of a strip of country several miles wide along the one hundred and third meridian between the parallels of 35° and 37°.

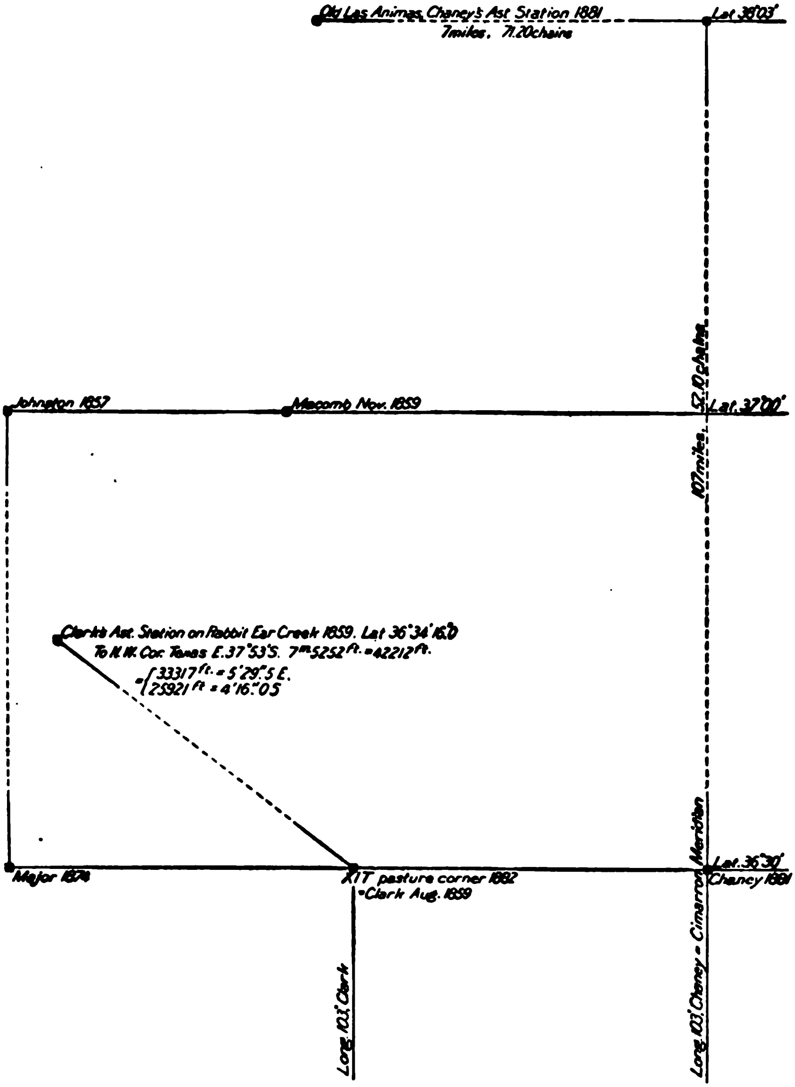

FIG. 5.—Diagram showing relations of the Johnston, Macomb, Major, Clark, and Chaney monuments.

	m.	ch.
Johnston to Macomb, teste Macomb, 1859, 11,582 feet =	2	15.39
Johnston to Macomb, teste Darling, 1868, 9,781 feet =	1	68.20
Johnston to Macomb, teste Major, 1874, 9,372 feet =	1	62
Johnston to Macomb, teste Preston, 1900, 9,778 feet =	1	68.15
Adopt..	1	68.15
Macomb to Cimarron meridian, teste Chaney, 1881, 12,822 feet =	2	34.28
Macomb to Cimarron meridian, teste Preston, 1900, 16,458 feet =	3	09.36
		ch.
Chaney to XIT pasture corner, teste Mabry, 1885, 11,487 feet =	2	14.05 and 5.89 S.
Chaney to XIT pasture corner, teste Preston, 1900, 11,527 feet =	2	14.65 and 5.47 S.

The Denver, Texas and Fort Worth Railroad passes near the northwest corner of Texas. The station Texline is near the corner. An astronomical station should be established here and an accurate determination made of its latitude and longitude. It would be well to set a line of iron posts along the one hundred and third meridian as reference marks for the topographic survey. In connection with such topographic survey care should be taken to discover, locate, and clearly show on the map all monuments and land corners. This done, we shall have the data for resurveying and remarking the boundary.

CONCLUSION.

1. The west boundary of the panhandle of Texas is fixed by law on the one hundred and third meridian.

2. Of the 310 miles composing the line 24 miles at the south end and 156 miles at the north end were surveyed and marked with monuments by Clark in 1859.

4. Clark's survey has been confirmed by the United States.

5. Clark's survey has not been confirmed or disputed by Texas.

6. Of Clark's monuments south of the Canadian we have no information. It seems probable that many or most of them are lost.

7. The boundary along the 130 miles not surveyed or marked by Clark is on the one hundred and third meridian as it shall hereafter be surveyed and confirmed.

8. As to the 24 miles at the south end we have no information to show that it is not on the true one hundred and third meridian.

9. As to that part of the Clark line running southward from the Canadian River, about 80 miles, we have no information as to its longitude except the monuments on the banks of the Canadian.

10. As to the longitude of that part of the Clark line north of the Canadian, we have no information except that depending upon Chaney's monument, according to which it is in about longitude 103° 02′ W.

11. Both Clark's and Chaney's longitude determinations are weak.

12. Until a new and trustworthy determination of the longitude has been made the boundary should be shown on the one hundred and third meridian from the Canadian southward and on the meridian of 103° 02′ from the Canadian northward.

13. A new and accurate determination of longitude should be made at an early day at a station in or near Texline, and this station should be connected with Chaney's monument, with the XIT corner, and with Clark's monuments 15, 16, and 17.

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STRUCTURAL DETAILS

IN THE

GREEN MOUNTAIN REGION

AND IN

EASTERN NEW YORK

(SECOND PAPER)

BY

T. NELSON DALE

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STRUCTURAL DETAILS IN THE GREEN MOUNTAIN REGION AND IN EASTERN NEW YORK.

(SECOND PAPER.)

By T. NELSON DALE.

INTRODUCTION.

Since the publication of the first paper with the above title, in 1896,[a] a few other details have been collected in the course of further explorations, and these are here presented with the same intent and in a similar manner.[b]

HORIZONTAL ISOCLINES.

The southern part of the Dorset Mountain mass in Dorset, Vt., called Mount Eolus by President Hitchcock, but known locally as Green Peak, is a mass of marble and calcareous rocks in almost horizontal position, capped by schists, and it probably forms the center of a very open syncline. Scarcely half a mile west of the schist cap the strike suddenly changes from N. or N. 15° E. to N. 50° E., and a similar strike recurs in the marble across the valley, a mile and a half to the southwest. The folds at the former place are most intricate, and include a horizontal isocline 45 feet long, as shown in fig. 1.[c]

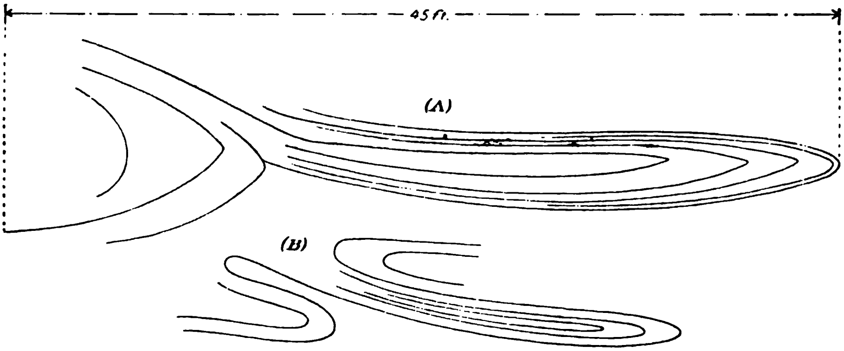

FIG. 1.—(*A*) Diagram sketch of horizontal isoclinal fold in white marble; old quarry seven-eighths mile west of the Owl's Head, Dorset, Vt. (*B*) diagram showing the probable general structure of (*A*)

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[a] Sixteenth Ann. Rept. U. S. Geol. Survey, Pt. I, 1896, pp. 549–570.

[b] This paper, however, does not include the structural details of the New York and Vermont slate belt, which will be found on pp. 199–217 of the Nineteenth Ann. Rept., Pt. III, 1899.

[c] A rough diagram of this appears in Hitchcock and Hager's Geological Report of Vermont, 1861.

Such completely recumbent isoclines are exceptional in this region, and their presence at this locality in the midst of a gently undulating structure is yet to be accounted for.[a]

PINCHED FOLDS.

Readers of the great masterpieces of Swiss geologists are familiar with those effects of extreme compression shown in the pinching of folds and in the tearing off of their cores or apices and their envelopment by the adjacent rock mass. Some of the earlier stages in this process are seen on a small scale at the locality in Dorset, Vt., just referred to. In Pl. I, *B*, the pinching off of the apex of the fold has just begun.

Sometimes this constriction occurs lower down on the limbs of the fold and results in the formation of more or less complete circles when the beds are seen in vertical cross section. Such a complete circle, a few inches in diameter, was observed by Mr. C. W. Hayes and the writer at a new quarry in banded marble opened in Pittsford, Vt., in 1901.

FAULTING IN A ZONE OF INTENSE FOLDING.

Tangential compression, after having partly expended itself in intense folding, may then result in faulting. The overthrust which begins in the town of Pittsford, Vt., and extends more than 10 miles into the town of Clarendon, and which has brought the Lower Cambrian of the eastern part of a ridge onto the Upper Ordovician of its western side, passes through Pine Hill in Proctor and Boardman Hill in Clarendon. Some of the characteristics of this fault have been published.[b]

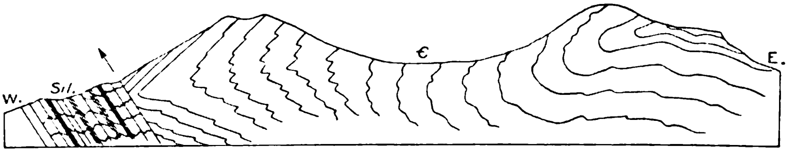

FIG. 2.—Diagram showing the probable general relations of the ledges (Pls. II and III) to the overthrust at the top of Boardman Hill, Clarendon, Vt.

At the top of Boardman Hill the Cambrian quartzite and schist come within a few inches of the Upper Ordovician schist. The former are intensely folded, as shown in Pls. II and III, and similar folding marks a large area east of the fault. In Pl. II is shown an overturned syncline of quartzite, the axial plane of which passed through the now dislocated piece at the left. In the inner part of the fold the pressure

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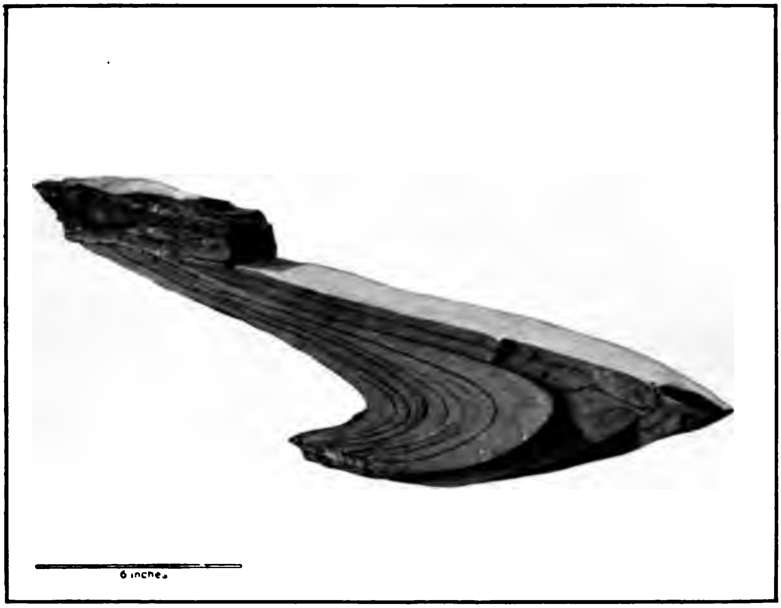
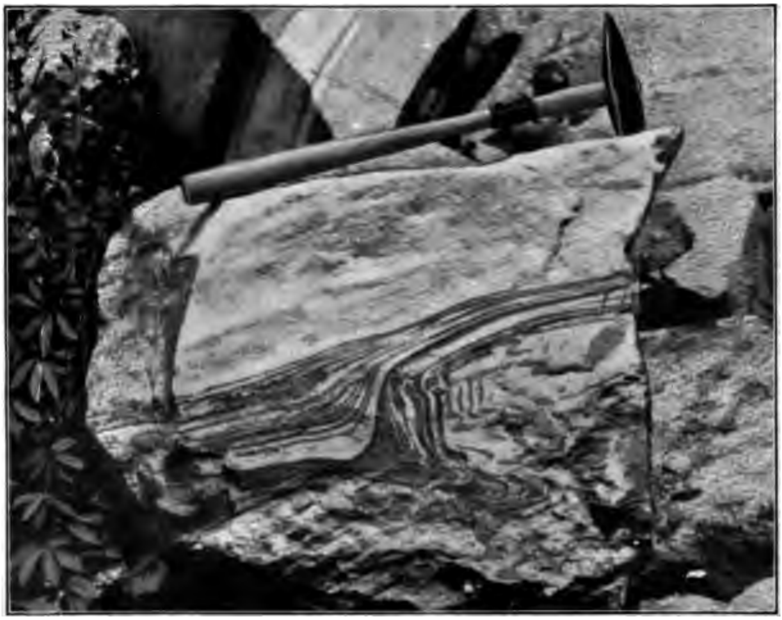
[a] For similar folds see Dr. Wolff's section of Hoosac Mountain in Mon. U. S. Geol. Survey Vol. XXIII, Pl. VI, and the writer's section on Lake Bomoseen in Nineteenth Ann. Rept., Pt. III, Pls. XVIII and XXXIV, A.

[b] On the structure of the ridge between the Taconic and Green Mountain ranges in Vermont, by T. Nelson Dale: Fourteenth Ann. Rept. U. S. Geol. Survey, Pt. II, 1895, pp. 525–549.



A. ELONGATED QUARTZITE FOLD FROM HILLOCK AT WEST END OF MAIN STREET, WILLIAMSTOWN, MASS.

In the lower part of specimen a quartz vein traverses the fold. The upper part shows the beginning of another fold.



B. PINCHED FOLD IN WHITE MARBLE.

Hammer, 21 inches long. The lower part of the block consists of impure dolomite. Quarry dumps seven-eighths of a mile west of the Owl's Head, Dorset, Vt.

has found relief in the formation of secondary folds zigzagging vertically across the major fold and giving little idea at that point of the general character of the fold. The axes of the major and minor folds must originally have lain at a considerable angle to the direction of compression, and the overturn was an after effect. The more plastic Ordovician graphitic schists on the under side of the thrust are marked by the usual cleavage, which, judging from other localities, is probably approximately parallel to the fault plane.[a] In fig. 2 the probable relations of the ledges in Pls. II and III to one another and to the fault are shown.

ELONGATION IN FOLDING.

Some of the more minute evidences of elongation were referred to in the first paper, but folding frequently involves more or less elongation. Where the folding is intense the elongation may become apparent. There is thinning of the beds along the limbs of the folds and thickening of them at their apices. Many cross sections of plicated rock, whether in a cliff or a microscopic section, illustrate this familiar geological principle.

Pl. I, *A*, represents a specimen of vitreous quartzite taken from a locality of intense and transverse folding,[b] being one of a descending series of overturned folds along the limb of a major anticline exposed in cross section on a vertical joint plane. While the limb of the fold at its narrowest place measures 1½ inches, its apex measures 11½ inches. If the bed be assumed to have measured 6½ inches prior to the folding—i. e., the average of the thinnest and thickest parts—there will have been a transfer of 77 per cent of material from the limb to the apex.

As the microscopic structure of the rocks of the vicinity indicates that metamorphism preceded as well as followed the folding, it may be assumed that this bed was quartzite prior to the folding. There is good evidence that the folding took place under a full half mile of other sediments.

The proportions of the specimen will be found repeated on a gigantic scale in many an Alpine section, but these proportions will, of course, vary with the intensity of the folding, and the limbs of the softer members of a fold may be so attenuated as to disappear altogether.

CAVES FORMED BY TENSION AND RUPTURE.

About a half mile northeast of the extreme southwest corner of the State of Vermont and of the town of Pownal, on the eastern side of the Taconic Range, the Ordovician schists are fissured in a direction parallel to the prevalent transverse jointing of the region. These fissures and joints strike N. 75°–80° E. and dip 90°. Between two of these a mass of rock 10 feet wide has been faulted down. In another the schists, which are noncalcareous and veined with quartz, have a cleavage striking N. 12° E. and dipping 45°–50° E. across a bedding dipping east at a much lower angle. These foliations have been parted in a N. 75° E. direction, leaving an irregular fissure from 1 to 5 feet wide and more than 130 feet deep across the schistosity and the veins which lie in it.

---

[a] See Fourteenth Ann. Rept., U. S. Geol. Survey, Pt. II, p. 537, fig. 56, and Sixteenth Ann. Rept., U. S. Geol. Survey, Pt. I, p. 565, fig. 95.

[b] Sixteenth Ann. Rept., U. S. Geol. Survey, Pt. I, pp. 553, 554, figs. 77, 78.

Such a cave is evidently formed by tension of the schist mass in the direction of the strike, and is the result of some later movement than that which produced the synclinoria and anticlinoria of the region.

SHEAR INDICATED BY ANNELID BORINGS.

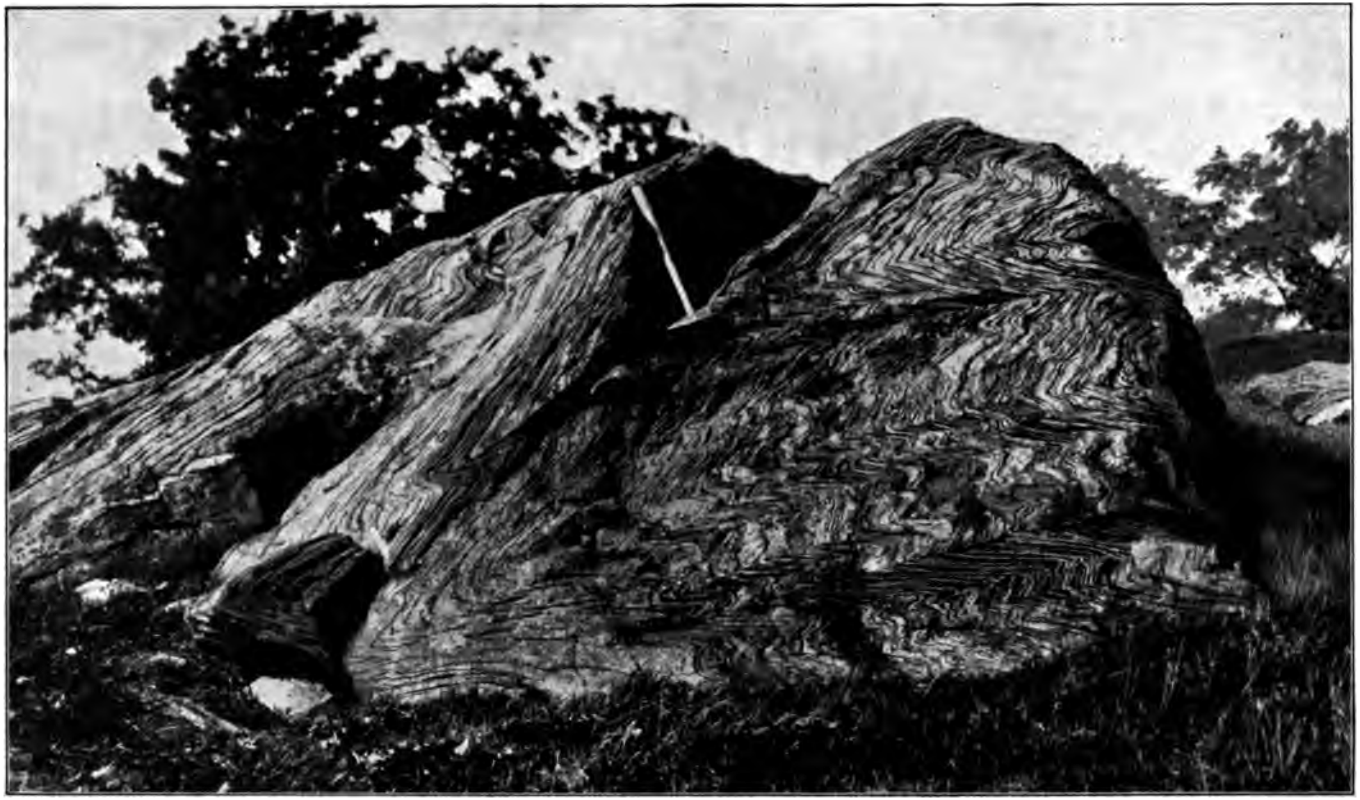
While Cambrian quartzite bowlders with annelid borings (*Scolithus*) are not infrequent in western Massachusetts and Vermont, the places where the borings may be studied in situ are few. One of these is in Arlington, Vt., on Roaring Brook, which has cut a ravine a thousand feet deep in the quartzite of the western flank of the Green Mountain range, and then, entering the Vermont Valley, flows into the Batten Kill.

At a point a half mile southeast of East Arlington, on the eastern side of the brook and road, the quartzite crops out, filled with annelid borings and dipping about N. 20° W. at an angle of 10°, the direction of the dip being probably due to the northerly pitch of a fold with a N.-S. axis. As borings made by annelids in sand are vertical, they should remain vertical to the bedding, which here dips 10°. This would give the borings an inclination of 10° from the vertical, or 80° from the horizontal in the opposite direction, which is S. 20° E., but they actually dip at an angle of 45° about S. 65° E. The amount of shear has thus deflected them 35°, and the direction of the shear has also deflected them 45° farther eastward.

The relation of deflected annelid borings to shear is akin to that of distorted fossil shells, trilobites, etc.

PLANO-CONVEX LIMESTONE CONCRETIONS.

In the belt of little or no metamorphism which borders the Hudson River in Rensselaer County, N. Y., there are large areas of Cambrian shales containing here and there beds of limestone. In the town of Nassau, about 2 miles southeast of the village of that name, these shales contain plano-convex disks of limestone which afford no evidence of organic structure and also differ in form from ordinary concretions and septaria. Fig. 3 shows one in cross section. They measure from



OVERTURNED SYNCLINE OF CAMBRIAN QUARTZITE ADJACENT TO AN OVERTHRUST; TOP OF BOARDMAN HILL, CLARENDON, VT.

Looking N. 35° E. Hammer 21 inches long.

19 to 52 inches in diameter and about 5 inches in thickness and have a slight depression on the under side. They occur in a bed of shale about 6 inches thick traversed by joints filled with calcite, and are separated from the overlying bed of limestone by a thin film of shale. As the beds dip at an angle of 50°, unless they have been overturned they represent one side of a syncline, and the convex side of the disks would thus be the under side.

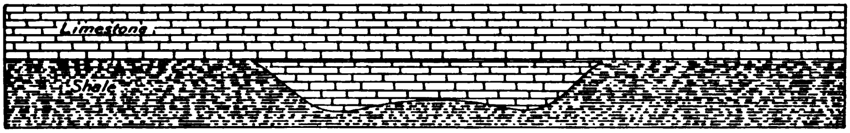


FIG. 3.—Diagram cross section of a plano-convex limestone concretion; Nassau, Rensselaer County, N. Y.; size of concretion, 42 by 5 inches.

It is suggested that they may have been formed by limestone sedimentation on an uneven clayey sea floor and have received their circular form from concretionary action.

INTERBEDDED CRYSTALLINE CALCITE AND DOLOMITE.

Vogt, in his exhaustive work on the marbles of Norway,[a] gives a section of interbedded and slightly plicated calcite and dolomite marble, and describes them as occurring usually in such association in that region. Although he does not undertake to account for their origin, he thinks that the dolomite is plainly not due to metasomatic processes.

In the Vermont marble belt there is an extensive deposit of more or less microcrystalline yellowish dolomite, which the painstaking local geologist Wing regarded as lying between the Cambrian quartzite and the Lower Ordovician calcite marble. There are, however, other minor beds of dolomite among the Ordovician marbles.

At the Green Peak quarries, already referred to,[b] there is an interbedding of the two rocks, like that described by Vogt in Norway, and they are also capped by schist. The dolomite, however, is quartzose and so very fine grained as to be properly termed microcrystalline, while the calcite marble is much coarser grained (see fig. 4). That this was calcite marble was determined by its strong effervescence under dilute hydrochloric acid. Mr. E. T. Allen, chemist of the Survey, reports it as "effervescing strongly in the cold and containing only a very little magnesium. Not a dolomite." A chemical analysis of the dolomite made by Mr. George Steiger in the laboratory of the United States Geological Survey yielded these results:

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[a] Norsk marmor, by J. H. L. Vogt: Norges Geologiske Undersögelse, No. 22, Kristiania, 1897, p. 219, fig. 42. This work contains, on pp. 334-364, a résumé in German. See also an abstract of it with several illustrations in Zeitschr. für prak. Geol., Jan., 1898, p. 9, and fig. 5.

[b] P. 9.

Chemical analysis of dolomite from Green Peak quarries, in Dorset, Vt.

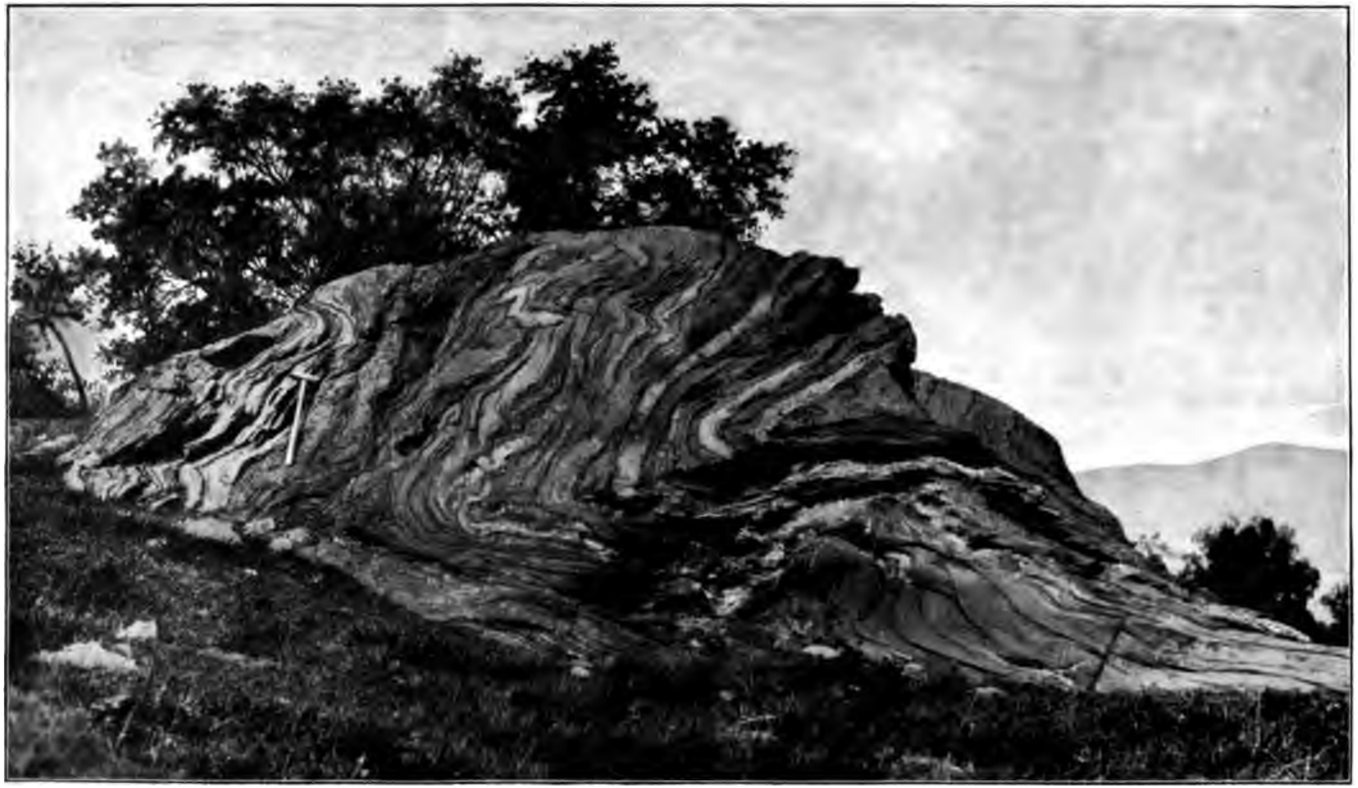
Constituent.	Molecular weight.	Soluble in boiling HCl.	Insoluble in boiling HCl.
		Per cent.	*Per cent.*
SiO_2	60.4		8.36
Al_2O_3	102		1.77
Fe_2O_3	160		.22
FeO	72	1.08	
MgO	40.3	16.44	.24
CaO	56	29.03	
Na_2O	62		.06
K_2O	94		1.08
H_2O-	18	.03	
H_2O+			.42
CO_2	44	41.66	
SO_3	80	None.	
Total		88.24	12.15
Soluble		88.24	
Insoluble		12.15	
Total		100.39	

A microscopic section of the same rock shows a granular mass of more or less angular but not interlocking transparent grains ranging from 0.025 to 0.07 mm. in diameter, without twinning and rarely with cleavage. The fineness of this grain appears by comparison: The West Rutland Statuary ranges from 0.07 to 0.3 mm., averaging about 0.15 mm., while the finest European marbles, as given by Vogt, range from 0.02 to 0.03 mm.

This mass contains sparsely disseminated grains of quartz, and rarely a grain of microcline or plagioclase or a flake of muscovite.

The quartz, feldspar, and muscovite account for the SiO_2, Al_2O_3 FeO, Na_2O, K_2O, and H_2O of the analysis. About 90 per cent of the rock is thus a dolomite in an extremely fine-grained crystalline condition. A piece of it was polished at the Survey laboratory.

The difference in the size of the grain of the two rocks is greater than at the Norwegian quarries. As both beds, calcite and dolomite, must have been subjected to an almost identical amount of pressure, this difference in grain must be due either to a difference in the condition of the original sediments, which must account for similar differ-



OVERTURNED SYNCLINE OF CAMBRIAN SCHIST, 50 FEET EAST OF OVERTHRUST; TOP OF BOARDMAN HILL, CLARENDON, VT.

Looking N. 35° E. Hammer, 21 inches long.

ences or grain in a continuous series of calcite marble beds, or to the different behavior of dolomite and calcite under equal pressure. Vogt points out that the greater tendency of bedded dolomite to complete its individual crystals than bedded calcite when subjected to the same regional metamorphism indicates that it possesses greater power of resistance to the effects of pressure. It is also harder than calcite.

In the section represented in fig. 4 there is a small quartzose bed between the dolomite and the calcite. This proves to be mainly fine-grained dolomite, but with more quartz grains and muscovite flakes and the same feldspars. It has also stringers of muscovite and lenses of coarsely crystalline calcite and quartz. This little bed probably represents a brief period of mingled argillaceous and calcareous sedimentation. As shown in the figure, there is also a lens of dolomite in one of the beds of calcite.

On the eastern side of Otter Creek Valley, 1½ miles SSE. of Proctor and near the Pine Hill overthrust, the calcite marble contains angular fragments of dolomite. In weathering, the dolomite, being less soluble by CO_2, stands out from the calcite as would hard pebbles in a conglomerate with a soluble cement. Thin sections of this rock show the same differences between the matrix and the fragments that were described as existing between the interbedded dolomite and calcite. This is probably a breccia formed from alternating beds of dolomite and calcite, the calcite having become coarsely crystalline and the dolomite microcrystalline in the process.

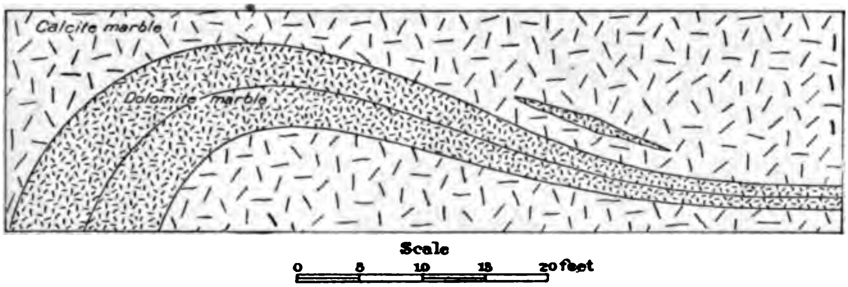


FIG. 4.—Diagram sketch of interbedded crystalline calcite and dolomite. Length, 40 feet. The dolomite is veined with quartz. Old quarry three-fifths mile west of the Owls Head, Dorset, Vt.

Do these alternations of dolomite and calcite correspond to alternations of chemical and organic sedimentation or to a difference in the calcium compounds extracted from the sea by different classes of organisms?[a]

---

[a] Professor Van Hise, notwithstanding Vogt's opinion, regards it possible that the alternations are due to the dolomitization of some beds and not of others.

Thin sections of plicated interbedded dolomite and phyllite, in which the beds of each rock measure about a millimeter in thickness, have been recently described from the Alps. See G. Allenspach, Dünnschliffe von gefälteltem Röthidolomit-Quartenschiefer am Piz Urlaun: Vierteljahrs. Naturforsch. Gesells. Zürich, 45. Jahrgang (1900), pp. 227-237. There can be little question as to the mechanical sedimentary origin of the phyllite beds.

LINES OF ROCK BEDDING CROSSING FELDSPAR CRYSTALS.

The frequent occurrence of albite feldspar in the rocks of the Green Mountain and Taconic ranges has been several times referred to in geological papers.[a]

In 1897 Mr. L. M. Prindle, then the writer's assistant, while working on Mount Anthony, in Bennington, came across a "prospect," about half a mile west of the top and 650 feet below it, known locally as Tibbetts mine. Here the Ordovician schists contain a vein, a few inches thick, of crystallized albite associated with quartz, chlorite, and pyrite.

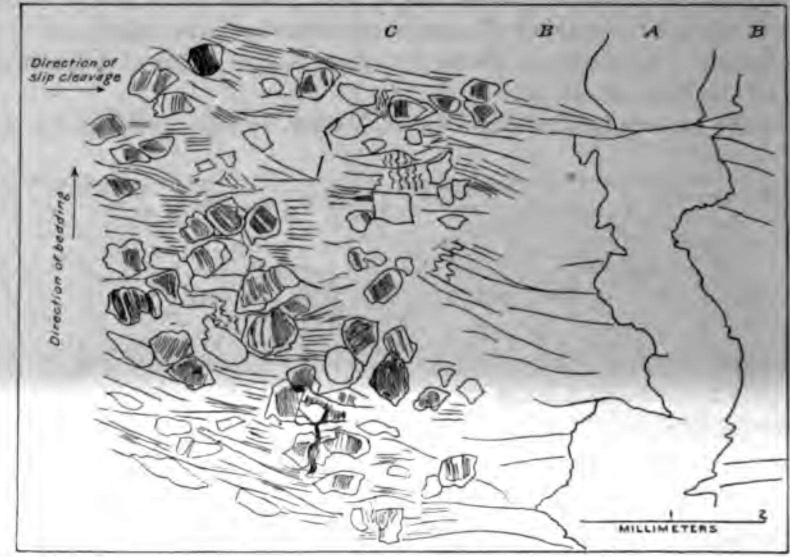


FIG. 5.—Diagram sketch of thin section of muscovite, chlorite, quartz, and albite schist from ledge three-fourths mile north of Green Peak, Dorset, Vt. *A*=quartz in bedding. *B*=Muscovite beds. *C*=Feldspar zone. Ordinary light.

"The feldspar is also irregularly mixed with the schist over a width of 2 feet or more."

A specimen of schist of the same age which caps the marble at Green Peak, in Dorset, Vt., collected by the writer's assistant, Mr. Fred H. Moffit, in 1899, shows the usual speckling with albite. The cleavage foliation at the ledge is horizontal, and a quartz vein, 6 inches thick, lies in it. Thin sections made anywhere across the cleavage show some very exceptional features. The rock consists mainly of muscovite and quartz, with a little chlorite, a few tabular octahedra of magnetite, black streaks and dots, possibly graphitic (although the

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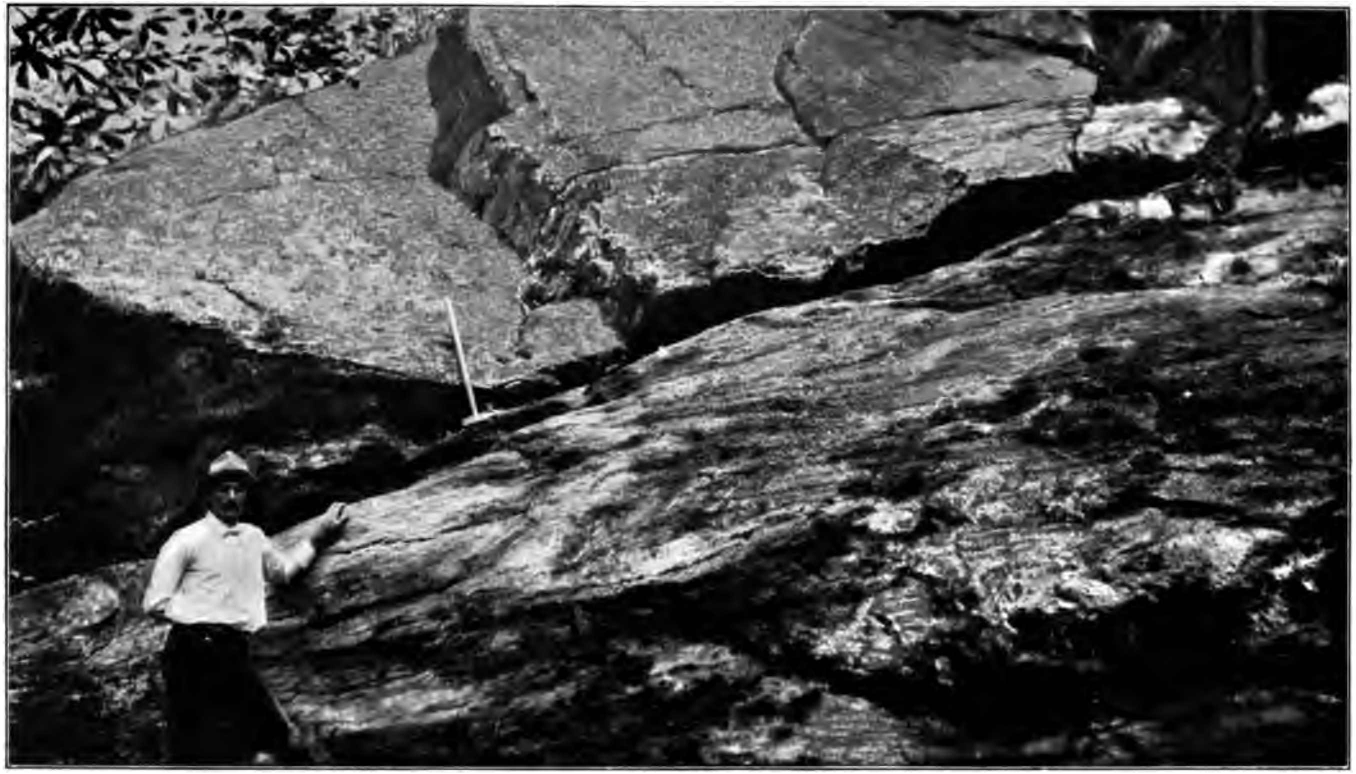
[a] Geology, Second District of New York State, 1842, by Ebenezer Emmons, p. 158. The specimen there referred to is probably the one still preserved in the Williams College collection.

Metamorphism of clastic feldspar in conglomerate schist, by J. E. Wolff: Bull. Mus. Comp. Zool., Cambridge, Mass., Vol. XVI, No. 10, 1891.

Geology of the Green Mountains in Massachusetts, by Pumpelly, Wolff, and Dale: Mon. U. S. Geol. Survey Vol. XXIII, 1894, pp. 52, 60–62, 183, 186–188, fig. 73, Pls. VII, *A*; VIII.



CONTACT OF PRE-CAMBRIAN GNEISS AND CAMBRIAN QUARTZITE, SOUTHWEST SIDE OF THE DOME, 2,200-FOOT CONTOUR, GREEN MOUNTAIN RANGE, POWNAL, VT.

Looking N. 70° E. Sledge handle, 30 inches long. The head of the sledge rests on gneiss; its handle on quartzite. Between these is a partially eroded bed of muscovite-schist. A secondary foliation in the gneiss is parallel to the bedding of the quartzite.

rock itself makes no black marks), limonite stain from the oxidation of the magnetite, and many albite feldspars. The bedding is extremely plicated and about at right angles to the slip cleavage. Some beds are more micaceous, others more quartzose (see fig. 5). Parallel to the course of the bedding are irregular zones of albite grains without crystal boundaries traversed by undulating graphitic (?) streaks, and sometimes inclosing a magnetite crystal. Where the grains are massed the black streaks of the different grains are parallel to one another, and in some places to the black streaks in the micaceous matrix, and also to the plications in the muscovite folia. The black streaks are apparently, therefore, stratified material. Usually, however, these feldspar grains have been so displaced by the shearing which produced the slip cleavage that the inclosed bedding lines have lost their proper orientation and point in any direction, appearing then like scattered pebbles from an older stratified rock.

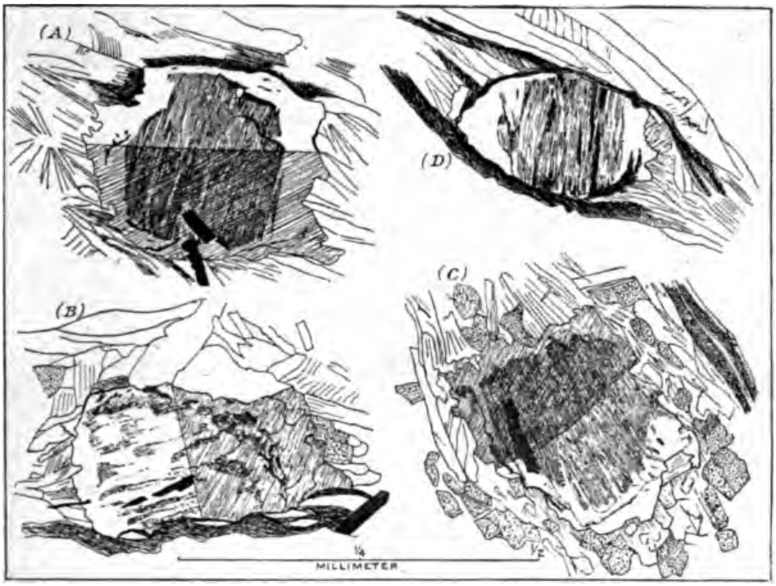


Fig. 6.—Sketches of albite feldspars from thin sections of muscovite-schist from ledge three-fourths mile north of Green Peak, Dorset, Vt. Polarized light. In *A*, *B*, *C*, *D*, inclusions of stratified material. In *A*, *B*, *C*, secondary enlargement beyond the ends of the bedding lines, also twinning across those lines, and inclusions of magnetite. The dark bands in the matrix are planes of slippage between fibers of muscovite discolored by limonite. Dotted grains are quartz; the rest is muscovite.

In most of these feldspars there has evidently been a secondary mineral growth, as a rim of clear feldspar extends beyond the termination of the bedding streaks, but the rim extinguishes with the core. Some of the albites are simple twins, the twinning plane being usually at right angles or diagonal to the included bedding lines (see fig. 6). Some of the feldspars are also irregularly disseminated in the cleavage foliation outside of the feldspathic zones.

This occurrence is a more complex phase of that described by Professor Wolff in the "White gneiss" of Hoosac Mountain,[a] in which feldspars are filled with inclusions of epidote, biotite, muscovite, etc., lying in "planes parallel to the arrangement of the minerals outside the feldspar, and entirely independent of the crystallographic directions in the feldspar." Such feldspars are necessarily secondary.

The history of the Green Peak schist appears to be this: Argillaceous and carbonaceous (?) sediment metamorphosed into muscovite, quartz, chlorite, magnetite, graphite (?), and feldspar schist; continued pressure produced plications; slip cleavage ensued, and displacement of feldspars, followed by their secondary growth. Whether the albite has replaced some other feldspar is uncertain.

DIVERGENT STRIKES IN UNCONFORMABLE DEPOSITS.

In a drift-bestrewn and forested region satisfactory contacts between distinct geological formations must needs be few. In the many miles of boundary between the pre-Cambrian gneisses and the Cambrian quartzites and schists and conglomerates of northwestern Massachusetts and western Vermont there are but few such points, and at these both formations are in apparent conformity.

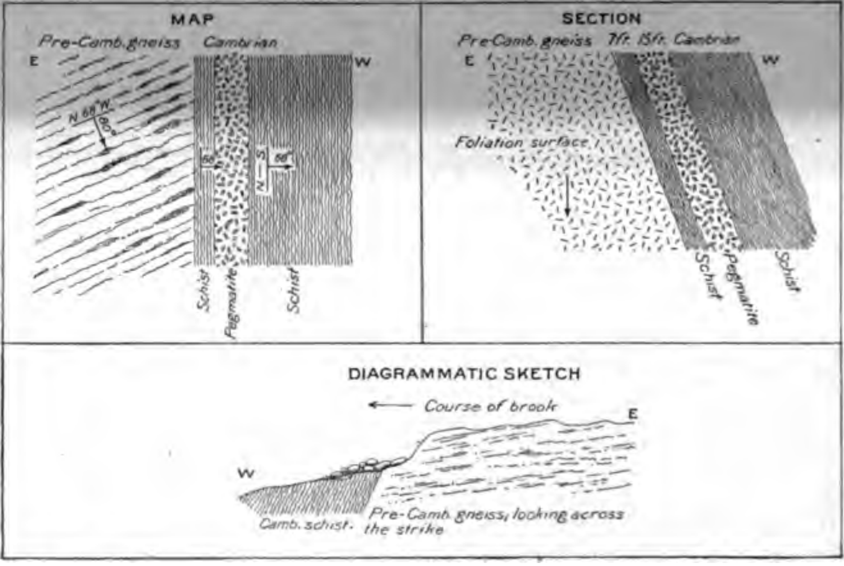


FIG. 7.—Diagrams illustrating the contact between pre-Cambrian gneiss and Cambrian schist in Downer Glen, Manchester, Vt.

There are some localities, however, where these formations are clearly unconformable. One of these is in a deep transverse incision in the western flank of the Green Mountain range, 3½ miles ESE. of

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[a] Mon. U. S. Geol. Survey Vol. XXIII, 1894, p. 52, Pl. VII, *A*.

Manchester village, known as Downer Glen. The pre-Cambrian gneisses form the bed of Bourn Brook, striking almost with its course. In looking up the stream the parallelism between the foliation lines of the gneiss, the course of the stream, and the sides of the ravine is apparent, but in looking downstream the micaceous quartzites of the Cambrian are seen striking at right angles to the bed of the brook and parallel to the trend of the range. The two formations approach within 50 feet of each other, the interval in the brook bed being covered with gravel and bowlders, but on the southern side of the ravine the actual contact can be observed, and a hand specimen, partly Cambrian, partly pre-Cambrian, could be secured. The relations are shown in fig. 7.

Another locality of like purport occurs about 26 miles SSW., on the southwestern side of The Dome, in Pownal, 2,200 feet above sea level (see Pl. IV). Here a mass of gneiss with a plicated foliation striking about E.-W. (N. 70° E. to N. 80° W.), underlies a bed of quartzite striking N. 45° W. and dipping 40° NE. This NE. dip is probably due to the local pitch of a fold striking NNE., as a half mile south the same rock dips gently SW. and the prevalent strike of the quartzite a little east of these localities is NNE. Between the gneiss and the quartzite is a bed, 1 foot thick, of muscovite-schist with some microcline. It appears to belong to the Cambrian, although it may belong to the gneiss, its original foliation having been obliterated in the shearing. The details of the gneiss are shown in fig 8.

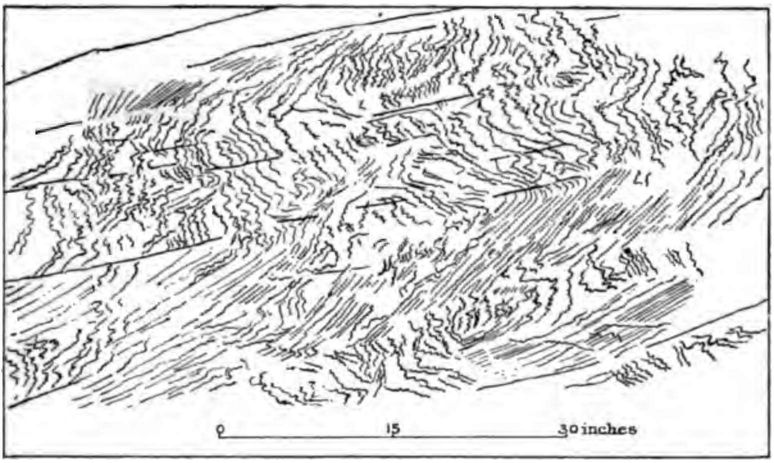

Fig. 8.—Structure in pre-Cambrian gneiss at its contact with Cambrian quartzite on The Dome in Pownal, Vt., as shown in Pl. IV. The axes of the plications strike about E.-W. and dip across the cleavage foliation; they are also unconformable to the bedding of the overlying quartzite. From a photograph.

On the western slope of Harmon Hill, in Woodford, Vt., about 19 miles SSW. of the first locality and 7 miles NNE. of The Dome, the pre-Cambrian and the Cambrian come very near together, although not in actual visible contact. The gneisses strike generally diagonally to the Green Mountain axis, while the Cambrian quartzite and schist strike a little west of north.

The questions that such localities awaken when compared with the conformable contacts which Professor Wolff describes on Hoosac Mountain[a] are these: Which of these relations is the normal one? Do the strikes of the gneiss which are at right angles to the Green Mountain range represent the result of the Algonkian orogenic movement unaffected by the Ordovician one? In that case the conformable strikes would be due to the powerful Ordovician movement having affected both Algonkian and Ordovician masses, turning the Algonkian axes about into conformity to the Ordovician axes. Or are these pre-Cambrian strikes transverse to the Green Mountain range purely local and exceptional? These few localities may be insufficient to decide so important a matter. Further investigations in Vermont and Canada ought to throw light upon it. The question whether we have here indications of the probable course of the first hills and valleys of Algonkian time is an interesting one.[b]

Michel Lévy, in a sketch map of central France collated mostly from official maps of the French geological survey,[c] gives in different colors the directions of two superposed orographic systems, one dating to Carboniferous time and meandering from east to west, the other to Tertiary time with axes nearly north and south. Could such a map be constructed for any considerable area in North America showing the difference between the directions of compression in Algonkian and Ordovician time?

CONCLUSIONS.

Notwithstanding the somewhat heterogeneous character of these local geological details, they all point to the complex interaction of mechanical stratigraphical processes with more obscure chemical molecular processes, and in one case at least with biological processes; and they also indicate what far-reaching inductions may be drawn or questions awakened by the study of phenomena occupying but an insignificant amount of space.

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[a] Mon. U. S. Geol. Survey, Vol. XXIII, 1894, fig. 27, p. 73.

[b] See, on the effect of a secondary horizontal movement on beds previously folded, Die Dislocationen der Erdrinde, by Emm. de Margerie and Albert Heim, Zürich, 1888, p. 87, and references on p. 118.

[c] Bull. Soc. géol. France, ser. 3, Vol. XVIII, 1889-90, Situation stratigraphique des régions volcaniques de l'Auvergne, pp. 692-693, Pl. XXII, fig. 1.

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